

Серебро



Ag



*Учащийся ГОУ лицея № 1571: Анфиногенов Алексей
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Цель: изучить историю открытия серебра, его распространение, характеристику, физико-химические свойства, применение серебра

Задачи:

1. Собрать теоретический материал о серебре, используя научно-популярную литературу и сеть интернет.
2. Составить на основе изученного материала мультимедийную презентацию для возможного дальнейшего использования учителем на уроках химии.
3. Осуществить среди школьников популяризацию знаний о металлах на примере серебра

План

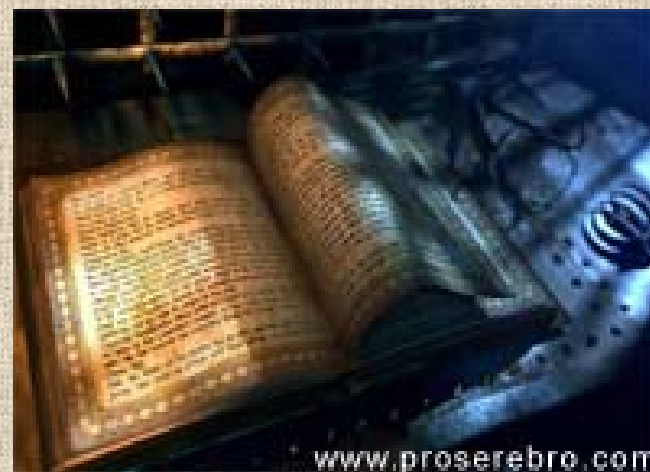
1. История серебра
2. Положение серебра в периодической таблице Д.И.Менделеева
3. Строение серебра
4. Физические свойства серебра
5. Минералы серебра
6. Месторождения серебра
7. Добыча серебра:
 - Цианирование серебра
 - Амальгамация серебра
8. Применение серебра:
 - Мировой спрос на серебро
 - Сплавы серебра
 - Целебные свойства серебра
 - Ювелирные изделия и посуда из серебра
 - История о серебряном паникадиле
 - Серебряные зеркала
 - Фотография и серебро
9. Заключение

История «серебра»

Свое название серебро ведет от санскритского слова "аргента", что значит "светлый".

Латинское название серебра «аргентум» как Древнегреческое «аргитос», шумерское «ку-баббар» и древнеегипетское «хад», означает «БЕЛОЕ».

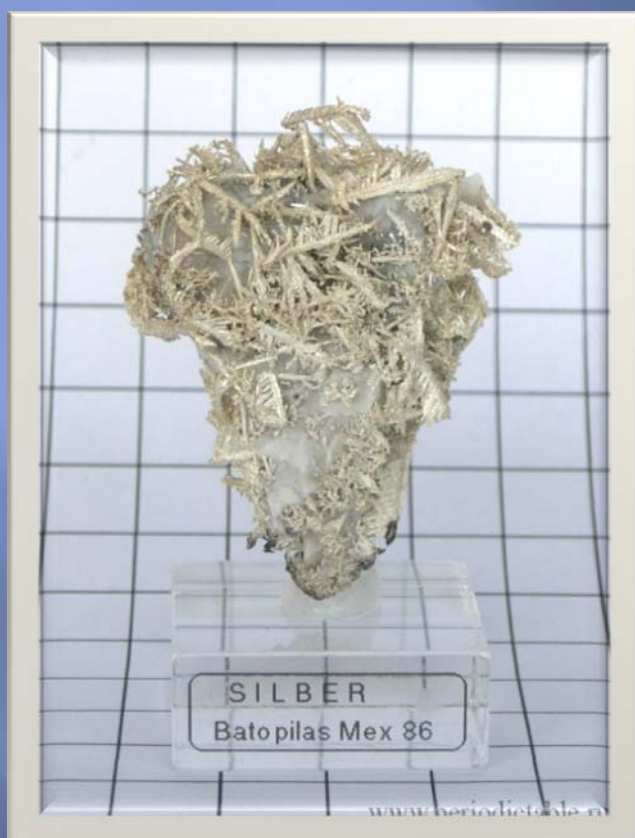
На русском «серебро», на немецком «зильбер», английском «сильвер» - эти слова восходят к древнеиндийскому слову «сарпа», которым обозначали Луну и Серп (по аналогии с Луной) – древнейшее орудие земледельца. Светлый блеск серебра несколько напоминает свет Луны – серебро в алхимический период развития химии часто связывали с Луной и обозначали



Положение серебра в периодической таблице Д.И. Менделеева

| Период Группа | | Слои | | Оболочки | | Последовательность заполнения оболочек | | Ряд | | ПЕРИОДИЧЕСКАЯ СИСТЕМА ХИМИЧЕСКИХ ЭЛЕМЕНТОВ Д. И. МЕНДЕЛЕЕВА | | | | | | | | | | | | | | | | | | | | | | | | VIII | | Ряд |
|------------------|----|---|---|---|--|--|--|-----|-----|--|--|-----|--|----|--|---|--|----|--|-----|--|---|--|------|--|-----|------|--|----|--|--|--|--|------|--|-----|
| | | | | | | | | | | a | | b | | a | | b | | | | | | | | | | | | | | | | | | | | |
| 1 | 2 | K | 1 | s ² | | | | 1 | 2 | II | | III | | IV | | V | | VI | | VII | | 2 | | 3, 4 | | 1 | | | | | | | | | | |
| 1 | 2 | K <td>1<td>s²<td></td><td></td><td></td><td>1</td><td>2</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>2</td><td colspan="2">3, 4</td><td>1</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>1</td><td>2</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>2</td><td colspan="2">3, 4</td><td>1</td></td> | s ² <td></td> <td></td> <td></td> <td>1</td> <td>2</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>2</td> <td colspan="2">3, 4</td> <td>1</td> | | | | 1 | 2 | a | | b | | a | | b | | a | | b | | a | | b | | 2 | 3, 4 | | 1 | | | | | | | |
| 2 | 8 | K <td>1<td>s²<td></td><td></td><td></td><td>3</td><td>4</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>3</td><td colspan="2">4</td><td>2</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>3</td><td>4</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>3</td><td colspan="2">4</td><td>2</td></td> | s ² <td></td> <td></td> <td></td> <td>3</td> <td>4</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>3</td> <td colspan="2">4</td> <td>2</td> | | | | 3 | 4 | a | | b | | a | | b | | a | | b | | a | | b | | 3 | 4 | | 2 | | | | | | | |
| 3 | 8 | K <td>1<td>s²<td></td><td></td><td></td><td>5</td><td>6</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>5</td><td colspan="2">6</td><td>3</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>5</td><td>6</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>5</td><td colspan="2">6</td><td>3</td></td> | s ² <td></td> <td></td> <td></td> <td>5</td> <td>6</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>5</td> <td colspan="2">6</td> <td>3</td> | | | | 5 | 6 | a | | b | | a | | b | | a | | b | | a | | b | | 5 | 6 | | 3 | | | | | | | |
| 4 | 18 | K <td>1<td>s²<td></td><td></td><td></td><td>7</td><td>8</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>7</td><td colspan="2">8</td><td>4</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>7</td><td>8</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>7</td><td colspan="2">8</td><td>4</td></td> | s ² <td></td> <td></td> <td></td> <td>7</td> <td>8</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>7</td> <td colspan="2">8</td> <td>4</td> | | | | 7 | 8 | a | | b | | a | | b | | a | | b | | a | | b | | 7 | 8 | | 4 | | | | | | | |
| 5 | 18 | K <td>1<td>s²<td></td><td></td><td></td><td>9</td><td>10</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>9</td><td colspan="2">10</td><td>5</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>9</td><td>10</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>9</td><td colspan="2">10</td><td>5</td></td> | s ² <td></td> <td></td> <td></td> <td>9</td> <td>10</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>9</td> <td colspan="2">10</td> <td>5</td> | | | | 9 | 10 | a | | b | | a | | b | | a | | b | | a | | b | | 9 | 10 | | 5 | | | | | | | |
| 6 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>11</td><td>12</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>11</td><td colspan="2">12</td><td>6</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>11</td><td>12</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>11</td><td colspan="2">12</td><td>6</td></td> | s ² <td></td> <td></td> <td></td> <td>11</td> <td>12</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>11</td> <td colspan="2">12</td> <td>6</td> | | | | 11 | 12 | a | | b | | a | | b | | a | | b | | a | | b | | 11 | 12 | | 6 | | | | | | | |
| 7 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>13</td><td>14</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>13</td><td colspan="2">14</td><td>7</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>13</td><td>14</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>13</td><td colspan="2">14</td><td>7</td></td> | s ² <td></td> <td></td> <td></td> <td>13</td> <td>14</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>13</td> <td colspan="2">14</td> <td>7</td> | | | | 13 | 14 | a | | b | | a | | b | | a | | b | | a | | b | | 13 | 14 | | 7 | | | | | | | |
| 8 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>15</td><td>16</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>15</td><td colspan="2">16</td><td>8</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>15</td><td>16</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>15</td><td colspan="2">16</td><td>8</td></td> | s ² <td></td> <td></td> <td></td> <td>15</td> <td>16</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>15</td> <td colspan="2">16</td> <td>8</td> | | | | 15 | 16 | a | | b | | a | | b | | a | | b | | a | | b | | 15 | 16 | | 8 | | | | | | | |
| 9 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>17</td><td>18</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>17</td><td colspan="2">18</td><td>9</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>17</td><td>18</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>17</td><td colspan="2">18</td><td>9</td></td> | s ² <td></td> <td></td> <td></td> <td>17</td> <td>18</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>17</td> <td colspan="2">18</td> <td>9</td> | | | | 17 | 18 | a | | b | | a | | b | | a | | b | | a | | b | | 17 | 18 | | 9 | | | | | | | |
| 10 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>19</td><td>20</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>19</td><td colspan="2">20</td><td>10</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>19</td><td>20</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>19</td><td colspan="2">20</td><td>10</td></td> | s ² <td></td> <td></td> <td></td> <td>19</td> <td>20</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>19</td> <td colspan="2">20</td> <td>10</td> | | | | 19 | 20 | a | | b | | a | | b | | a | | b | | a | | b | | 19 | 20 | | 10 | | | | | | | |
| 11 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>21</td><td>22</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>21</td><td colspan="2">22</td><td>11</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>21</td><td>22</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>21</td><td colspan="2">22</td><td>11</td></td> | s ² <td></td> <td></td> <td></td> <td>21</td> <td>22</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>21</td> <td colspan="2">22</td> <td>11</td> | | | | 21 | 22 | a | | b | | a | | b | | a | | b | | a | | b | | 21 | 22 | | 11 | | | | | | | |
| 12 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>23</td><td>24</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>23</td><td colspan="2">24</td><td>12</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>23</td><td>24</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>23</td><td colspan="2">24</td><td>12</td></td> | s ² <td></td> <td></td> <td></td> <td>23</td> <td>24</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>23</td> <td colspan="2">24</td> <td>12</td> | | | | 23 | 24 | a | | b | | a | | b | | a | | b | | a | | b | | 23 | 24 | | 12 | | | | | | | |
| 13 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>25</td><td>26</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>25</td><td colspan="2">26</td><td>13</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>25</td><td>26</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>25</td><td colspan="2">26</td><td>13</td></td> | s ² <td></td> <td></td> <td></td> <td>25</td> <td>26</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>25</td> <td colspan="2">26</td> <td>13</td> | | | | 25 | 26 | a | | b | | a | | b | | a | | b | | a | | b | | 25 | 26 | | 13 | | | | | | | |
| 14 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>27</td><td>28</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>27</td><td colspan="2">28</td><td>14</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>27</td><td>28</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>27</td><td colspan="2">28</td><td>14</td></td> | s ² <td></td> <td></td> <td></td> <td>27</td> <td>28</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>27</td> <td colspan="2">28</td> <td>14</td> | | | | 27 | 28 | a | | b | | a | | b | | a | | b | | a | | b | | 27 | 28 | | 14 | | | | | | | |
| 15 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>29</td><td>30</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>29</td><td colspan="2">30</td><td>15</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>29</td><td>30</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>29</td><td colspan="2">30</td><td>15</td></td> | s ² <td></td> <td></td> <td></td> <td>29</td> <td>30</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>29</td> <td colspan="2">30</td> <td>15</td> | | | | 29 | 30 | a | | b | | a | | b | | a | | b | | a | | b | | 29 | 30 | | 15 | | | | | | | |
| 16 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>31</td><td>32</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>31</td><td colspan="2">32</td><td>16</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>31</td><td>32</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>31</td><td colspan="2">32</td><td>16</td></td> | s ² <td></td> <td></td> <td></td> <td>31</td> <td>32</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>31</td> <td colspan="2">32</td> <td>16</td> | | | | 31 | 32 | a | | b | | a | | b | | a | | b | | a | | b | | 31 | 32 | | 16 | | | | | | | |
| 17 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>33</td><td>34</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>33</td><td colspan="2">34</td><td>17</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>33</td><td>34</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>33</td><td colspan="2">34</td><td>17</td></td> | s ² <td></td> <td></td> <td></td> <td>33</td> <td>34</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>33</td> <td colspan="2">34</td> <td>17</td> | | | | 33 | 34 | a | | b | | a | | b | | a | | b | | a | | b | | 33 | 34 | | 17 | | | | | | | |
| 18 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>35</td><td>36</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>35</td><td colspan="2">36</td><td>18</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>35</td><td>36</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>35</td><td colspan="2">36</td><td>18</td></td> | s ² <td></td> <td></td> <td></td> <td>35</td> <td>36</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>35</td> <td colspan="2">36</td> <td>18</td> | | | | 35 | 36 | a | | b | | a | | b | | a | | b | | a | | b | | 35 | 36 | | 18 | | | | | | | |
| 19 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>37</td><td>38</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>37</td><td colspan="2">38</td><td>19</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>37</td><td>38</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>37</td><td colspan="2">38</td><td>19</td></td> | s ² <td></td> <td></td> <td></td> <td>37</td> <td>38</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>37</td> <td colspan="2">38</td> <td>19</td> | | | | 37 | 38 | a | | b | | a | | b | | a | | b | | a | | b | | 37 | 38 | | 19 | | | | | | | |
| 20 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>39</td><td>40</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>39</td><td colspan="2">40</td><td>20</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>39</td><td>40</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>39</td><td colspan="2">40</td><td>20</td></td> | s ² <td></td> <td></td> <td></td> <td>39</td> <td>40</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>39</td> <td colspan="2">40</td> <td>20</td> | | | | 39 | 40 | a | | b | | a | | b | | a | | b | | a | | b | | 39 | 40 | | 20 | | | | | | | |
| 21 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>41</td><td>42</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>41</td><td colspan="2">42</td><td>21</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>41</td><td>42</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>41</td><td colspan="2">42</td><td>21</td></td> | s ² <td></td> <td></td> <td></td> <td>41</td> <td>42</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>41</td> <td colspan="2">42</td> <td>21</td> | | | | 41 | 42 | a | | b | | a | | b | | a | | b | | a | | b | | 41 | 42 | | 21 | | | | | | | |
| 22 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>43</td><td>44</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>43</td><td colspan="2">44</td><td>22</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>43</td><td>44</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>43</td><td colspan="2">44</td><td>22</td></td> | s ² <td></td> <td></td> <td></td> <td>43</td> <td>44</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>43</td> <td colspan="2">44</td> <td>22</td> | | | | 43 | 44 | a | | b | | a | | b | | a | | b | | a | | b | | 43 | 44 | | 22 | | | | | | | |
| 23 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>45</td><td>46</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>45</td><td colspan="2">46</td><td>23</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>45</td><td>46</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>45</td><td colspan="2">46</td><td>23</td></td> | s ² <td></td> <td></td> <td></td> <td>45</td> <td>46</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>45</td> <td colspan="2">46</td> <td>23</td> | | | | 45 | 46 | a | | b | | a | | b | | a | | b | | a | | b | | 45 | 46 | | 23 | | | | | | | |
| 24 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>47</td><td>48</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>47</td><td colspan="2">48</td><td>24</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>47</td><td>48</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>47</td><td colspan="2">48</td><td>24</td></td> | s ² <td></td> <td></td> <td></td> <td>47</td> <td>48</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>47</td> <td colspan="2">48</td> <td>24</td> | | | | 47 | 48 | a | | b | | a | | b | | a | | b | | a | | b | | 47 | 48 | | 24 | | | | | | | |
| 25 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>49</td><td>50</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>49</td><td colspan="2">50</td><td>25</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>49</td><td>50</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>49</td><td colspan="2">50</td><td>25</td></td> | s ² <td></td> <td></td> <td></td> <td>49</td> <td>50</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>49</td> <td colspan="2">50</td> <td>25</td> | | | | 49 | 50 | a | | b | | a | | b | | a | | b | | a | | b | | 49 | 50 | | 25 | | | | | | | |
| 26 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>51</td><td>52</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>51</td><td colspan="2">52</td><td>26</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>51</td><td>52</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>51</td><td colspan="2">52</td><td>26</td></td> | s ² <td></td> <td></td> <td></td> <td>51</td> <td>52</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>51</td> <td colspan="2">52</td> <td>26</td> | | | | 51 | 52 | a | | b | | a | | b | | a | | b | | a | | b | | 51 | 52 | | 26 | | | | | | | |
| 27 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>53</td><td>54</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>53</td><td colspan="2">54</td><td>27</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>53</td><td>54</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>53</td><td colspan="2">54</td><td>27</td></td> | s ² <td></td> <td></td> <td></td> <td>53</td> <td>54</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>53</td> <td colspan="2">54</td> <td>27</td> | | | | 53 | 54 | a | | b | | a | | b | | a | | b | | a | | b | | 53 | 54 | | 27 | | | | | | | |
| 28 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>55</td><td>56</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>55</td><td colspan="2">56</td><td>28</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>55</td><td>56</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>55</td><td colspan="2">56</td><td>28</td></td> | s ² <td></td> <td></td> <td></td> <td>55</td> <td>56</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>55</td> <td colspan="2">56</td> <td>28</td> | | | | 55 | 56 | a | | b | | a | | b | | a | | b | | a | | b | | 55 | 56 | | 28 | | | | | | | |
| 29 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>57</td><td>58</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>57</td><td colspan="2">58</td><td>29</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>57</td><td>58</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>57</td><td colspan="2">58</td><td>29</td></td> | s ² <td></td> <td></td> <td></td> <td>57</td> <td>58</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>57</td> <td colspan="2">58</td> <td>29</td> | | | | 57 | 58 | a | | b | | a | | b | | a | | b | | a | | b | | 57 | 58 | | 29 | | | | | | | |
| 30 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>59</td><td>60</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>59</td><td colspan="2">60</td><td>30</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>59</td><td>60</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>59</td><td colspan="2">60</td><td>30</td></td> | s ² <td></td> <td></td> <td></td> <td>59</td> <td>60</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>59</td> <td colspan="2">60</td> <td>30</td> | | | | 59 | 60 | a | | b | | a | | b | | a | | b | | a | | b | | 59 | 60 | | 30 | | | | | | | |
| 31 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>61</td><td>62</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>61</td><td colspan="2">62</td><td>31</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>61</td><td>62</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>61</td><td colspan="2">62</td><td>31</td></td> | s ² <td></td> <td></td> <td></td> <td>61</td> <td>62</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>61</td> <td colspan="2">62</td> <td>31</td> | | | | 61 | 62 | a | | b | | a | | b | | a | | b | | a | | b | | 61 | 62 | | 31 | | | | | | | |
| 32 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>63</td><td>64</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>63</td><td colspan="2">64</td><td>32</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>63</td><td>64</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>63</td><td colspan="2">64</td><td>32</td></td> | s ² <td></td> <td></td> <td></td> <td>63</td> <td>64</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>63</td> <td colspan="2">64</td> <td>32</td> | | | | 63 | 64 | a | | b | | a | | b | | a | | b | | a | | b | | 63 | 64 | | 32 | | | | | | | |
| 33 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>65</td><td>66</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>65</td><td colspan="2">66</td><td>33</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>65</td><td>66</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>65</td><td colspan="2">66</td><td>33</td></td> | s ² <td></td> <td></td> <td></td> <td>65</td> <td>66</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>65</td> <td colspan="2">66</td> <td>33</td> | | | | 65 | 66 | a | | b | | a | | b | | a | | b | | a | | b | | 65 | 66 | | 33 | | | | | | | |
| 34 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>67</td><td>68</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>67</td><td colspan="2">68</td><td>34</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>67</td><td>68</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>67</td><td colspan="2">68</td><td>34</td></td> | s ² <td></td> <td></td> <td></td> <td>67</td> <td>68</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>67</td> <td colspan="2">68</td> <td>34</td> | | | | 67 | 68 | a | | b | | a | | b | | a | | b | | a | | b | | 67 | 68 | | 34 | | | | | | | |
| 35 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>69</td><td>70</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>69</td><td colspan="2">70</td><td>35</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>69</td><td>70</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>69</td><td colspan="2">70</td><td>35</td></td> | s ² <td></td> <td></td> <td></td> <td>69</td> <td>70</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>69</td> <td colspan="2">70</td> <td>35</td> | | | | 69 | 70 | a | | b | | a | | b | | a | | b | | a | | b | | 69 | 70 | | 35 | | | | | | | |
| 36 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>71</td><td>72</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>71</td><td colspan="2">72</td><td>36</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>71</td><td>72</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>71</td><td colspan="2">72</td><td>36</td></td> | s ² <td></td> <td></td> <td></td> <td>71</td> <td>72</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>71</td> <td colspan="2">72</td> <td>36</td> | | | | 71 | 72 | a | | b | | a | | b | | a | | b | | a | | b | | 71 | 72 | | 36 | | | | | | | |
| 37 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>73</td><td>74</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>73</td><td colspan="2">74</td><td>37</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>73</td><td>74</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>73</td><td colspan="2">74</td><td>37</td></td> | s ² <td></td> <td></td> <td></td> <td>73</td> <td>74</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>73</td> <td colspan="2">74</td> <td>37</td> | | | | 73 | 74 | a | | b | | a | | b | | a | | b | | a | | b | | 73 | 74 | | 37 | | | | | | | |
| 38 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>75</td><td>76</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>75</td><td colspan="2">76</td><td>38</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>75</td><td>76</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>75</td><td colspan="2">76</td><td>38</td></td> | s ² <td></td> <td></td> <td></td> <td>75</td> <td>76</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>75</td> <td colspan="2">76</td> <td>38</td> | | | | 75 | 76 | a | | b | | a | | b | | a | | b | | a | | b | | 75 | 76 | | 38 | | | | | | | |
| 39 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>77</td><td>78</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>77</td><td colspan="2">78</td><td>39</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>77</td><td>78</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>77</td><td colspan="2">78</td><td>39</td></td> | s ² <td></td> <td></td> <td></td> <td>77</td> <td>78</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>77</td> <td colspan="2">78</td> <td>39</td> | | | | 77 | 78 | a | | b | | a | | b | | a | | b | | a | | b | | 77 | 78 | | 39 | | | | | | | |
| 40 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>79</td><td>80</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>79</td><td colspan="2">80</td><td>40</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>79</td><td>80</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>79</td><td colspan="2">80</td><td>40</td></td> | s ² <td></td> <td></td> <td></td> <td>79</td> <td>80</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>79</td> <td colspan="2">80</td> <td>40</td> | | | | 79 | 80 | a | | b | | a | | b | | a | | b | | a | | b | | 79 | 80 | | 40 | | | | | | | |
| 41 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>81</td><td>82</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>81</td><td colspan="2">82</td><td>41</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>81</td><td>82</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>81</td><td colspan="2">82</td><td>41</td></td> | s ² <td></td> <td></td> <td></td> <td>81</td> <td>82</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>81</td> <td colspan="2">82</td> <td>41</td> | | | | 81 | 82 | a | | b | | a | | b | | a | | b | | a | | b | | 81 | 82 | | 41 | | | | | | | |
| 42 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>83</td><td>84</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>83</td><td colspan="2">84</td><td>42</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>83</td><td>84</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>83</td><td colspan="2">84</td><td>42</td></td> | s ² <td></td> <td></td> <td></td> <td>83</td> <td>84</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>83</td> <td colspan="2">84</td> <td>42</td> | | | | 83 | 84 | a | | b | | a | | b | | a | | b | | a | | b | | 83 | 84 | | 42 | | | | | | | |
| 43 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>85</td><td>86</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>85</td><td colspan="2">86</td><td>43</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>85</td><td>86</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>85</td><td colspan="2">86</td><td>43</td></td> | s ² <td></td> <td></td> <td></td> <td>85</td> <td>86</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>85</td> <td colspan="2">86</td> <td>43</td> | | | | 85 | 86 | a | | b | | a | | b | | a | | b | | a | | b | | 85 | 86 | | 43 | | | | | | | |
| 44 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>87</td><td>88</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>87</td><td colspan="2">88</td><td>44</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>87</td><td>88</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>87</td><td colspan="2">88</td><td>44</td></td> | s ² <td></td> <td></td> <td></td> <td>87</td> <td>88</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>87</td> <td colspan="2">88</td> <td>44</td> | | | | 87 | 88 | a | | b | | a | | b | | a | | b | | a | | b | | 87 | 88 | | 44 | | | | | | | |
| 45 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>89</td><td>90</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>89</td><td colspan="2">90</td><td>45</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>89</td><td>90</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>89</td><td colspan="2">90</td><td>45</td></td> | s ² <td></td> <td></td> <td></td> <td>89</td> <td>90</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>89</td> <td colspan="2">90</td> <td>45</td> | | | | 89 | 90 | a | | b | | a | | b | | a | | b | | a | | b | | 89 | 90 | | 45 | | | | | | | |
| 46 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>91</td><td>92</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>91</td><td colspan="2">92</td><td>46</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>91</td><td>92</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>91</td><td colspan="2">92</td><td>46</td></td> | s ² <td></td> <td></td> <td></td> <td>91</td> <td>92</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>91</td> <td colspan="2">92</td> <td>46</td> | | | | 91 | 92 | a | | b | | a | | b | | a | | b | | a | | b | | 91 | 92 | | 46 | | | | | | | |
| 47 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>93</td><td>94</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>93</td><td colspan="2">94</td><td>47</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>93</td><td>94</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>93</td><td colspan="2">94</td><td>47</td></td> | s ² <td></td> <td></td> <td></td> <td>93</td> <td>94</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>93</td> <td colspan="2">94</td> <td>47</td> | | | | 93 | 94 | a | | b | | a | | b | | a | | b | | a | | b | | 93 | 94 | | 47 | | | | | | | |
| 48 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>95</td><td>96</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>95</td><td colspan="2">96</td><td>48</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>95</td><td>96</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>95</td><td colspan="2">96</td><td>48</td></td> | s ² <td></td> <td></td> <td></td> <td>95</td> <td>96</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>95</td> <td colspan="2">96</td> <td>48</td> | | | | 95 | 96 | a | | b | | a | | b | | a | | b | | a | | b | | 95 | 96 | | 48 | | | | | | | |
| 49 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>97</td><td>98</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>97</td><td colspan="2">98</td><td>49</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>97</td><td>98</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>97</td><td colspan="2">98</td><td>49</td></td> | s ² <td></td> <td></td> <td></td> <td>97</td> <td>98</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>97</td> <td colspan="2">98</td> <td>49</td> | | | | 97 | 98 | a | | b | | a | | b | | a | | b | | a | | b | | 97 | 98 | | 49 | | | | | | | |
| 50 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>99</td><td>100</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>99</td><td colspan="2">100</td><td>50</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>99</td><td>100</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>99</td><td colspan="2">100</td><td>50</td></td> | s ² <td></td> <td></td> <td></td> <td>99</td> <td>100</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>99</td> <td colspan="2">100</td> <td>50</td> | | | | 99 | 100 | a | | b | | a | | b | | a | | b | | a | | b | | 99 | 100 | | 50 | | | | | | | |
| 51 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>101</td><td>102</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>101</td><td colspan="2">102</td><td>51</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>101</td><td>102</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>101</td><td colspan="2">102</td><td>51</td></td> | s ² <td></td> <td></td> <td></td> <td>101</td> <td>102</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>101</td> <td colspan="2">102</td> <td>51</td> | | | | 101 | 102 | a | | b | | a | | b | | a | | b | | a | | b | | 101 | 102 | | 51 | | | | | | | |
| 52 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>103</td><td>104</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>103</td><td colspan="2">104</td><td>52</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>103</td><td>104</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>103</td><td colspan="2">104</td><td>52</td></td> | s ² <td></td> <td></td> <td></td> <td>103</td> <td>104</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>103</td> <td colspan="2">104</td> <td>52</td> | | | | 103 | 104 | a | | b | | a | | b | | a | | b | | a | | b | | 103 | 104 | | 52 | | | | | | | |
| 53 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>105</td><td>106</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>105</td><td colspan="2">106</td><td>53</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>105</td><td>106</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>105</td><td colspan="2">106</td><td>53</td></td> | s ² <td></td> <td></td> <td></td> <td>105</td> <td>106</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>105</td> <td colspan="2">106</td> <td>53</td> | | | | 105 | 106 | a | | b | | a | | b | | a | | b | | a | | b | | 105 | 106 | | 53 | | | | | | | |
| 54 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>107</td><td>108</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>107</td><td colspan="2">108</td><td>54</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>107</td><td>108</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>107</td><td colspan="2">108</td><td>54</td></td> | s ² <td></td> <td></td> <td></td> <td>107</td> <td>108</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>107</td> <td colspan="2">108</td> <td>54</td> | | | | 107 | 108 | a | | b | | a | | b | | a | | b | | a | | b | | 107 | 108 | | 54 | | | | | | | |
| 55 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>109</td><td>110</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>109</td><td colspan="2">110</td><td>55</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>109</td><td>110</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>109</td><td colspan="2">110</td><td>55</td></td> | s ² <td></td> <td></td> <td></td> <td>109</td> <td>110</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>109</td> <td colspan="2">110</td> <td>55</td> | | | | 109 | 110 | a | | b | | a | | b | | a | | b | | a | | b | | 109 | 110 | | 55 | | | | | | | |
| 56 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>111</td><td>112</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>111</td><td colspan="2">112</td><td>56</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>111</td><td>112</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>111</td><td colspan="2">112</td><td>56</td></td> | s ² <td></td> <td></td> <td></td> <td>111</td> <td>112</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>111</td> <td colspan="2">112</td> <td>56</td> | | | | 111 | 112 | a | | b | | a | | b | | a | | b | | a | | b | | 111 | 112 | | 56 | | | | | | | |
| 57 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>113</td><td>114</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>113</td><td colspan="2">114</td><td>57</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>113</td><td>114</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>113</td><td colspan="2">114</td><td>57</td></td> | s ² <td></td> <td></td> <td></td> <td>113</td> <td>114</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>113</td> <td colspan="2">114</td> <td>57</td> | | | | 113 | 114 | a | | b | | a | | b | | a | | b | | a | | b | | 113 | 114 | | 57 | | | | | | | |
| 58 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>115</td><td>116</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>115</td><td colspan="2">116</td><td>58</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>115</td><td>116</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>115</td><td colspan="2">116</td><td>58</td></td> | s ² <td></td> <td></td> <td></td> <td>115</td> <td>116</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>115</td> <td colspan="2">116</td> <td>58</td> | | | | 115 | 116 | a | | b | | a | | b | | a | | b | | a | | b | | 115 | 116 | | 58 | | | | | | | |
| 59 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>117</td><td>118</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>117</td><td colspan="2">118</td><td>59</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>117</td><td>118</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>117</td><td colspan="2">118</td><td>59</td></td> | s ² <td></td> <td></td> <td></td> <td>117</td> <td>118</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>117</td> <td colspan="2">118</td> <td>59</td> | | | | 117 | 118 | a | | b | | a | | b | | a | | b | | a | | b | | 117 | 118 | | 59 | | | | | | | |
| 60 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>119</td><td>120</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>119</td><td colspan="2">120</td><td>60</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>119</td><td>120</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>119</td><td colspan="2">120</td><td>60</td></td> | s ² <td></td> <td></td> <td></td> <td>119</td> <td>120</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>119</td> <td colspan="2">120</td> <td>60</td> | | | | 119 | 120 | a | | b | | a | | b | | a | | b | | a | | b | | 119 | 120 | | 60 | | | | | | | |
| 61 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>121</td><td>122</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>121</td><td colspan="2">122</td><td>61</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>121</td><td>122</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>121</td><td colspan="2">122</td><td>61</td></td> | s ² <td></td> <td></td> <td></td> <td>121</td> <td>122</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>121</td> <td colspan="2">122</td> <td>61</td> | | | | 121 | 122 | a | | b | | a | | b | | a | | b | | a | | b | | 121 | 122 | | 61 | | | | | | | |
| 62 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>123</td><td>124</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>123</td><td colspan="2">124</td><td>62</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>123</td><td>124</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>123</td><td colspan="2">124</td><td>62</td></td> | s ² <td></td> <td></td> <td></td> <td>123</td> <td>124</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>123</td> <td colspan="2">124</td> <td>62</td> | | | | 123 | 124 | a | | b | | a | | b | | a | | b | | a | | b | | 123 | 124 | | 62 | | | | | | | |
| 63 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>125</td><td>126</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>125</td><td colspan="2">126</td><td>63</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>125</td><td>126</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>125</td><td colspan="2">126</td><td>63</td></td> | s ² <td></td> <td></td> <td></td> <td>125</td> <td>126</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>125</td> <td colspan="2">126</td> <td>63</td> | | | | 125 | 126 | a | | b | | a | | b | | a | | b | | a | | b | | 125 | 126 | | 63 | | | | | | | |
| 64 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>127</td><td>128</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>127</td><td colspan="2">128</td><td>64</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>127</td><td>128</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>127</td><td colspan="2">128</td><td>64</td></td> | s ² <td></td> <td></td> <td></td> <td>127</td> <td>128</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>127</td> <td colspan="2">128</td> <td>64</td> | | | | 127 | 128 | a | | b | | a | | b | | a | | b | | a | | b | | 127 | 128 | | 64 | | | | | | | |
| 65 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>129</td><td>130</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>129</td><td colspan="2">130</td><td>65</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>129</td><td>130</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>129</td><td colspan="2">130</td><td>65</td></td> | s ² <td></td> <td></td> <td></td> <td>129</td> <td>130</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>129</td> <td colspan="2">130</td> <td>65</td> | | | | 129 | 130 | a | | b | | a | | b | | a | | b | | a | | b | | 129 | 130 | | 65 | | | | | | | |
| 66 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>131</td><td>132</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>131</td><td colspan="2">132</td><td>66</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>131</td><td>132</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>131</td><td colspan="2">132</td><td>66</td></td> | s ² <td></td> <td></td> <td></td> <td>131</td> <td>132</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>131</td> <td colspan="2">132</td> <td>66</td> | | | | 131 | 132 | a | | b | | a | | b | | a | | b | | a | | b | | 131 | 132 | | 66 | | | | | | | |
| 67 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>133</td><td>134</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>133</td><td colspan="2">134</td><td>67</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>133</td><td>134</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>133</td><td colspan="2">134</td><td>67</td></td> | s ² <td></td> <td></td> <td></td> <td>133</td> <td>134</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>133</td> <td colspan="2">134</td> <td>67</td> | | | | 133 | 134 | a | | b | | a | | b | | a | | b | | a | | b | | 133 | 134 | | 67 | | | | | | | |
| 68 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>135</td><td>136</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>135</td><td colspan="2">136</td><td>68</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>135</td><td>136</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>135</td><td colspan="2">136</td><td>68</td></td> | s ² <td></td> <td></td> <td></td> <td>135</td> <td>136</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>135</td> <td colspan="2">136</td> <td>68</td> | | | | 135 | 136 | a | | b | | a | | b | | a | | b | | a | | b | | 135 | 136 | | 68 | | | | | | | |
| 69 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>137</td><td>138</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>137</td><td colspan="2">138</td><td>69</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>137</td><td>138</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>137</td><td colspan="2">138</td><td>69</td></td> | s ² <td></td> <td></td> <td></td> <td>137</td> <td>138</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>137</td> <td colspan="2">138</td> <td>69</td> | | | | 137 | 138 | a | | b | | a | | b | | a | | b | | a | | b | | 137 | 138 | | 69 | | | | | | | |
| 70 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>139</td><td>140</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>139</td><td colspan="2">140</td><td>70</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>139</td><td>140</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>139</td><td colspan="2">140</td><td>70</td></td> | s ² <td></td> <td></td> <td></td> <td>139</td> <td>140</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>139</td> <td colspan="2">140</td> <td>70</td> | | | | 139 | 140 | a | | b | | a | | b | | a | | b | | a | | b | | 139 | 140 | | 70 | | | | | | | |
| 71 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>141</td><td>142</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>141</td><td colspan="2">142</td><td>71</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>141</td><td>142</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>141</td><td colspan="2">142</td><td>71</td></td> | s ² <td></td> <td></td> <td></td> <td>141</td> <td>142</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>141</td> <td colspan="2">142</td> <td>71</td> | | | | 141 | 142 | a | | b | | a | | b | | a | | b | | a | | b | | 141 | 142 | | 71 | | | | | | | |
| 72 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>143</td><td>144</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>143</td><td colspan="2">144</td><td>72</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>143</td><td>144</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>143</td><td colspan="2">144</td><td>72</td></td> | s ² <td></td> <td></td> <td></td> <td>143</td> <td>144</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>143</td> <td colspan="2">144</td> <td>72</td> | | | | 143 | 144 | a | | b | | a | | b | | a | | b | | a | | b | | 143 | 144 | | 72 | | | | | | | |
| 73 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>145</td><td>146</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>145</td><td colspan="2">146</td><td>73</td></td></td> | 1 <td>s²<td></td><td></td><td></td><td>145</td><td>146</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>145</td><td colspan="2">146</td><td>73</td></td> | s ² <td></td> <td></td> <td></td> <td>145</td> <td>146</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>145</td> <td colspan="2">146</td> <td>73</td> | | | | 145 | 146 | a | | b | | a | | b | | a | | b | | a | | b | | 145 | 146 | | 73 | | | | | | | |
| 74 | 32 | K <td>1<td>s²<td></td><td></td><td></td><td>147</td><td>148</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>147</td><td colspan="2">148</td><td>74</td></</td></td> | 1 <td>s²<td></td><td></td><td></td><td>147</td><td>148</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td colspan="2">a</td><td colspan="2">b</td><td>147</td><td colspan="2">148</td><td>74</td></</td> | s ² <td></td> <td></td> <td></td> <td>147</td> <td>148</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td colspan="2">a</td> <td colspan="2">b</td> <td>147</td> <td colspan="2">148</td> <td>74</td> </ | | | | 147 | 148 | a | | b | | a | | b | | a | | b | | a | | b | | 147 | 148 | | 74 | | | | | | | |

Особенности строения серебра



| | |
|----------------------------------|--------------------------|
| Порядковый номер | 47 |
| Атомный вес | 107,870 у.е. |
| Валентность | I, (II), (III) |
| Степень окисления | 1+, (2+), (3+) |
| Массовые числа | 107, 109 |
| природных изотопов | $K L-M$ |
| Электронная структура атома меди | $4s^2 4p^6 4d^{10} 5s^1$ |

Физические свойства серебра



Серебро (*Ag - argentum*) - драгоценный металл белого цвета, тягучий, пластичный и ковкий.

Обладает прочностью, электрической и термической проводимостью (самые высокие показатели электропроводности и теплопроводности среди всех металлов). Имеет также

Минералы серебра

Известно более 50 природных минералов серебра, из которых важное промышленное значение имеют лишь 15-20



Самородное серебро



Электрум (золото – серебро)

Минералы серебра



Аргентоярозит
(серебро – железо – сера)



Полибазит
(серебро – медь – сурьма – сера)



Пираргирит
(серебро – сурьма – сера)



Агвиларит
(серебро – селен – сера)

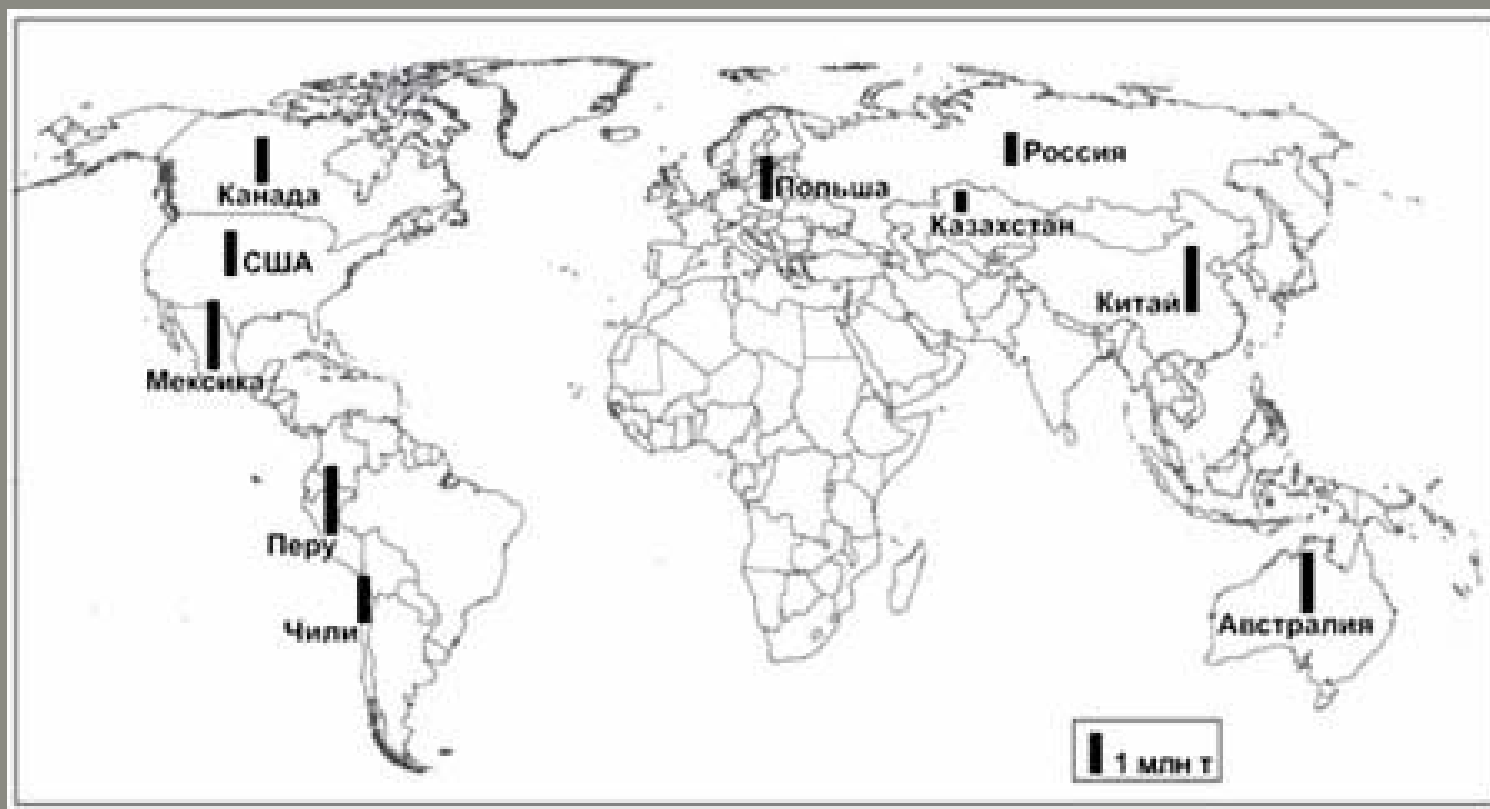
Месторождения серебра

Открытие Америки привело к открытию богатейших месторождений серебра: Кордильеры от Аляски до Огненной земли остаются главным источником серебра.



Настоящей сокровищницей является Мексика. На долю Мексики приходится треть всего добытого в 1521-1945 годах серебра - это около 205 тысяч тонн. Мексика и сейчас занимает ведущее место, добывая ежегодно около 3 тысяч тонн серебра.

Месторождения серебра



Наиболее крупные производители серебра - Мексика (2323 т, 1995), Перу (1910 т), США (1550 т), Канада (1207 т) и Чили (1042 т). В США 77% серебра добывается в Неваде (37% добычи), Айдахо (21%), Монтане (12%) и Аризоне (7%).

Добыча серебра

В V-VI веках до нашей эры наиболее крупным центром добычи металла были Лаврийские рудники в Греции. В конце VI и середине I века до нашей эры центр производства сместился в Испанию и Карфаген.



Во II-XIII веках действовало множество серебряных рудников, а в XV-XVI веках главным районом добычи серебра стали Рудные горы.

Добыча серебра в древности



Из россыпей благородные металлы извлекали промывкой песков на щитах, поверх которых укладывали шкуры животных с подстриженной шерстью (для улавливания крупинок золота), а также при помощи примитивных желобов, лотков и ковшей. Благородные металлы из руд добывали нагреванием породы до растрескивания с последующими дроблением глыб в каменных ступах, истиранием жерновами и промывкой. Разделение по крупности проводили на ситах.

Добыча серебра в древности



Из техники того времени интересны способ разделения сплавов золота и серебра кислотами, выделение золота и серебра из свинцового сплава купеляцией (Древний Египет), извлечение золота амальгамированием ртутью или с помощью жировой поверхности (Древняя Греция).

Купеляцию осуществляли в глиняных тиглях, куда добавляли свинец, соль, олово и отруби.

Первое собственное серебро в России было добыто на Нерчинских рудниках Забайкалья в 1704 году. Однако его добывалось ничтожно мало.

Коренной перелом в серебряной индустрии произошел только в 60-х годах XX столетия, когда были освоены многочисленные месторождения Дальнего Востока.



По данным 1989 года многие десятилетия страны Американского континента поставляют более 55% всего серебра ежегодно. Большая часть оставшихся 45% приходится на Австралию и Россию

Добыча самородного серебра

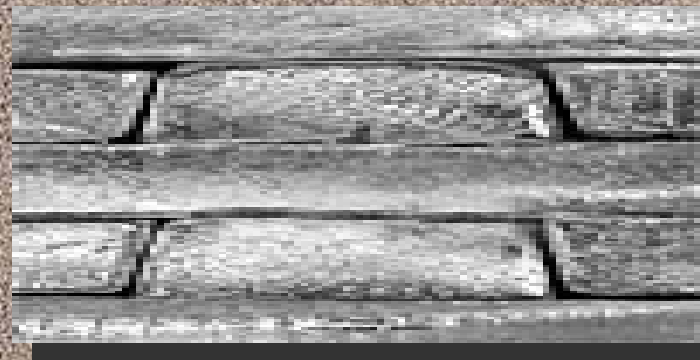
Самородное серебро встречается значительно реже самородного золота, и, вероятно, поэтому было открыто позже золота. Возможно также, что самородное серебро было открыто позже потому, что оно имело тусклый-грязный-окисленный вид.



Добыча самородного серебра составляет 20% от всей добычи серебра. Серебряные руды содержат до 80% серебра (аргентин - соединения серебра и серы), но основную массу серебра получают попутно при выплавке и рафинировании (очистке) свинца и меди. Из руд серебро получают **цианированием и амальгамацией**

Цианирование серебра

Цианирование - самый распространенный способ - основан на растворении металла в водных растворах щелочей цианистых.



Амальгамирование серебра

Амальгамация известна уже более 2 тыс. лет. Основана она на способности серебра или золота при нормальных условиях вступать в соединение со ртутью. Ртуть, в которой уже растворено небольшое количество серебра, улучшает смачиваемость металла.

Процесс амальгамации происходит в специальных амальгамационных аппаратах. Измельченную руду пропускают вместе с водой по амальгамированной поверхности ртути. В результате частицы серебра, смачиваясь ртутью, образуют полужидкую амальгаму, из которой путем отжима избытка ртути получают твердую часть амальгамы. Ее состав может иметь 1 ч. серебра и 2 ч. ртути. После такой фильтрации ртуть испаряют, а оставшееся серебро сплавляют в слитки.



*Структура мирового спроса на серебро, тонн**

| Сферы потребления | 2004 | годы 2005 | 2006 |
|---|-------|--------------|-------|
| Ювелирное производство | 9455 | 8982 | 8447 |
| Фотография | 6700 | 6475 | 5676 |
| Производство электронных приборов и аккумуляторных батарей | 3430 | 3166 | 3244 |
| Прочие сферы потребления | 6127 | 6021 | 6915 |
| Нетто-импорт в страны с переходной экономикой из других стран | 311 | 311 | 311 |
| Всего | 26023 | 25079 | 23813 |

Сплавы серебра

| | | | | | |
|-----|----|----|----------------------------------|------|---------------------------------------|
| 960 | - | - | Белый | Медь | Филигранные изделия тонкой работы |
| 925 | - | - | Белый | Медь | Предметы сервировки стола |
| 916 | 88 | 22 | Белый | Медь | Филигранные изделия, изделия с эмалью |
| 875 | 84 | 21 | Белый ² | Медь | Ювелирно-бытовые изделия |
| 800 | - | - | Белый ³ | Медь | Ювелирно-бытовые изделия |
| 750 | - | - | Белый с незначительной желтизной | Медь | Ювелирные изделия мелкой галантереи |

Целебные свойства серебра

**Свойство серебра
подавлять и
предотвращать
инфекционные
заболевания,
опустошавшие Европу,
отразилось в популярной
до сих пор, но
появившейся именно
тогда пословице
"родился с серебряной
ложкой во рту".**



В 1939 году Советом по Фармакологии и Химии при Американской медицинской ассоциации было задокументировано 96 различных медицинских препаратов на основе серебра.

За 2500 лет до нашей эры египетские воины использовали серебро для лечения боевых ран – накладывали на них тонкие серебряные пластины, и раны быстро заживали. В русской же православной церкви святую воду для прихожан всегда выдерживали в серебряных сосудах.



Серебряная вода

В 30-ых годах прошлого века почти одновременно в нескольких странах, в том числе и в России, был создан и отработан метод электролитического обогащения воды ионами (наночастицами) **серебра**. В результате был получен самый универсальный, безопасный в потреблении, и эффективный препарат на основе **серебра**, состоящий всего из двух ингредиентов: воды и мельчайших взвешенных наночастиц - **ионов серебра**. Его название - это водный коллоид **серебра**, или просто, - "серебряная вода".



ПИТЬЕВАЯ - вода, в которой концентрация ионов серебра составляет 35 мкг/литр.

Такая вода по санитарным нормам разрешена для употребления в пищу .

КОНЦЕНТРАТ - вода, в которой концентрация ионов серебра составляет 10 000 мкг/литр. Этой водой можно пользоваться для ингаляций при

бронхо-легочных заболеваниях, а также в косметических целях для умывания, для полива растений и их семян, для мытья фруктов и овощей.

Пить концентрат серебряной воды нельзя.

Серебро нетоксично и доступно, не накапливается в тканях, а выводится из организма в течение 7–10 дней. До 40-х годов в медицине и ветеринарии серебро успешно применялось при поражениях кожи (экземы, язвы), глаз, мочеполовой сферы и ЖКТ (гастриты, энтериты, гельминтозы) как бактерицидное и противовоспалительное средство.

Препараты серебра — **колларгол** (на основе казеина для лечения гнойных ран) и **протаргол** (на основе желатина для орошения горла и носа, промывания глаз и мочевыводящих путей) действуют более ста лет.



Главной причиной инфекционных болезней считались бактерии; и когда позволила технология, настала эра антибиотиков – препаратов на основе грибков (плесени).

Силой грибков подавляли бактерии. О серебре стали забывать и практически забыли. Возможно за серебром будущее и Нострадамус не просто так упоминал этот целебный металл...



Применение

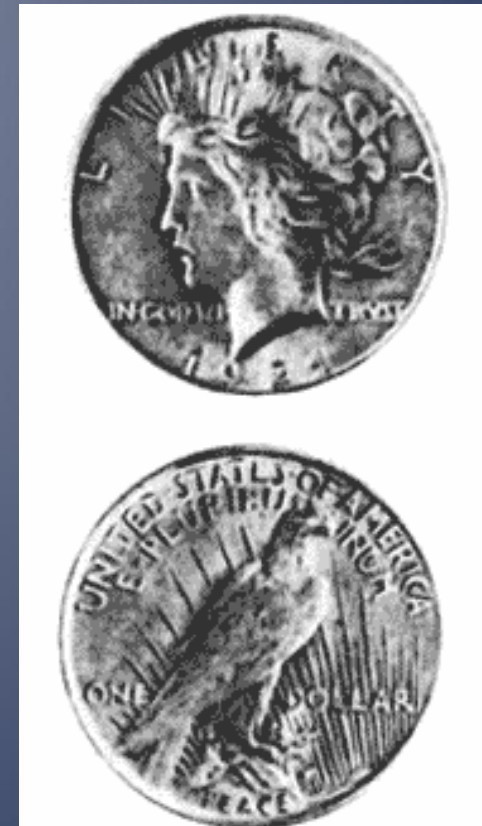
Церковная
утварь



Электротехника,
аккумуляторы



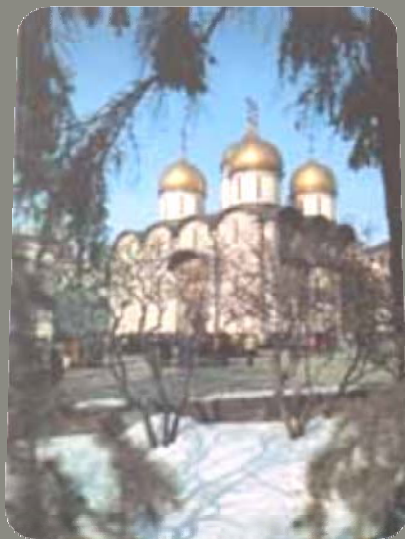
Деньги



Ювелирные изделия и посуда



Немного истории...



*Успенский собор –
красивейшее сооружение
Московского Кремля.
Во время войны 1812 года он,
как и многие памятники
Кремля, сильно пострадал.*



Именно тогда он лишился многих ценностей и художественных памятников. После изгнания неприятеля из Москвы в соборе начались восстановительные работы. Из серебра, отбитого казаками у отступающей наполеоновской армии, в память о победе было отлито серебряное паникадило, украшенное цветами и гирляндами, весом 328 кг. Это одна из достопримечательностей собора.

О зеркалах



Зеркала появились задолго до новой эры. Ими служили отполированные до блеска металлические пластинки из золота, серебра и бронзы (сплав меди и олова). Серебряные зеркала были наилучшими по качеству отражения. В I в. н.э. начали изготавливать стеклянные зеркала.

В 1858 году Карл Либих предложил изготавливать стеклянные зеркала с серебряным покрытием.



О зеркалах

Разработанный метод Либиха состоял из следующих операций.

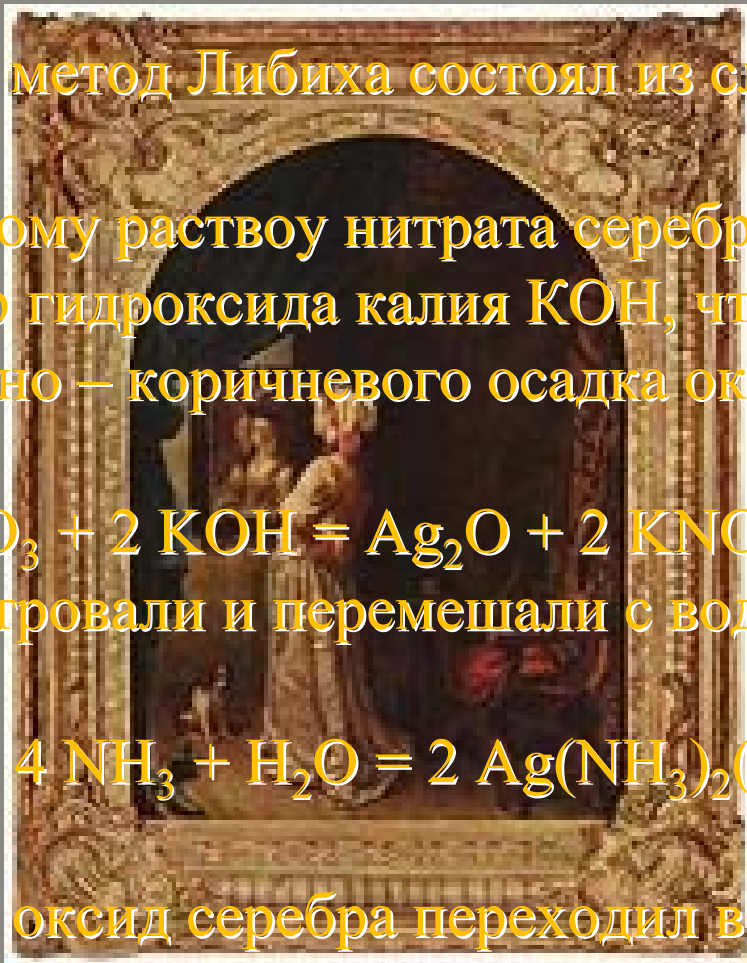
Сначала к водному раствору нитрата серебра AgNO_3 добавляли водный раствор гидроксида калия KOH , что приводило к осаждению черно — коричневого осадка оксида серебра Ag_2O :



Осадок отфильтровали и перемешали с водным раствором аммиака NH_3 :



В этой реакции оксид серебра переходил в раствор в виде гидроксида диамминсеребра.



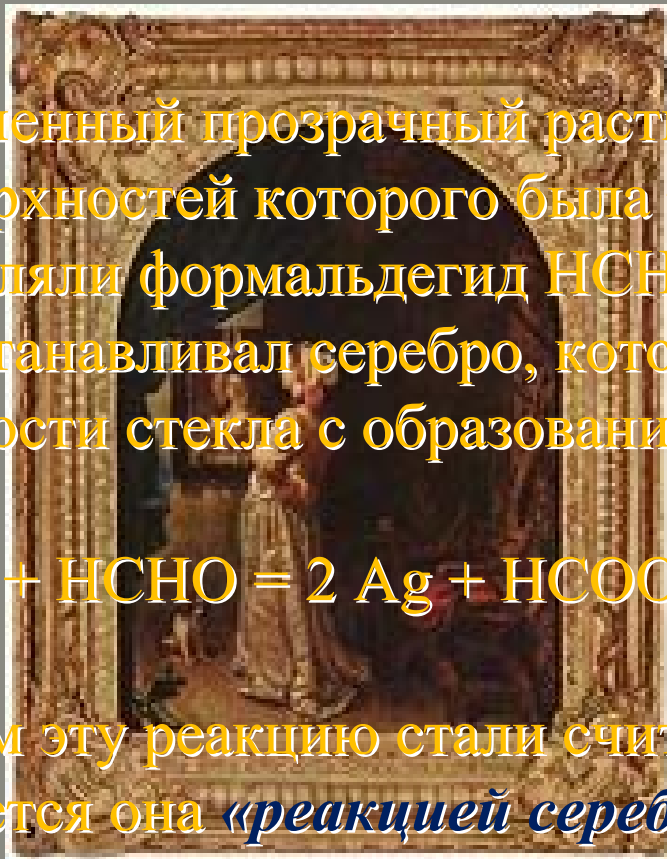
О зеркалах

Затем в полученный прозрачный раствор погружали лист стекла, одна из поверхностей которого была тщательно обезжирена, и добавляли формальдегид HCHO .

Формальдегид восстанавливал серебро, которое осаждалось на очищенной поверхности стекла с образованием зеркала.



В дальнейшем эту реакцию стали считать качественной на альдегиды и называется она *«реакцией серебряного зеркала»*.





NH_4OH

Фото – и кинопроизводство



Явление светочувствительности стало известно еще в древности, когда обратили внимание на выцветание окрашенных тканей, но еще не связывали его с действием света. Впервые действию света было приписано почернение поверхности кости, обработанной раствором серебра в азотной кислоте, т. е. раствором AgNO_3 (В. Гомберг, 1694).

Позднее светочувствительность хлористого серебра наблюдали Шульце (1727) и Шееле (1777). Шульце не только подтвердил явление светочувствительности, но и впервые показал возможность светописаи.



*Получение таких чудесных фотографий было бы
невозможно без участия фотохимических препаратов
на основе серебра*





Серебро – металл, который
скрывает много тайн и загадок...

Автор проекта

*Анфиногенов
Алексей*

