Bereich: Vererbung (2)	
Periodensystem	**Musterlösung**
Package: de.dhbwka.java.exercise.classes.periodic	**Klasse:** PeriodicTable

```java
package de.dhbwka.java.exercise.classes.periodic;

/**
 * @author DHBW lecturer
 * @version 1.0
 *
 * Part of lectures on 'Programming in Java'. Baden-Wuerttemberg
 * Cooperative State University.
 *
 * (C) 2016 by J. Sidler, T. Schlachter, C. Schmitt, W. Suess
 */
public class Element {

    public static final int SOLID = 1;
    public static final int LIQUID = 2;
    public static final int GAS = 3;
    public static final String[] phases =
        { "Plasma", "fest", "flüssig", "gasförmig" };

    public static final boolean MAIN = true;
    public static final boolean SIDE = false;

    private String name;
    private String symbol;
    private int ordinal;
    private char shell;
    private int phase;
    private boolean group;

    public Element() {
    }

    public Element(String name, String symbol, int ordinal,
                char shell, int phase, boolean group) {
        super();
        this.name = name;
        this.symbol = symbol;
        this.ordinal = ordinal;
        this.shell = shell;
        this.phase = phase;
        this.group = group;
    }


    @Override
    public String toString() {
        return name + " (" + symbol + "," + ordinal + ")" +
                    " Schale: " + shell + ", " + phases[phase] +
                    ", group: "  + (group ? "Hauptgruppe" : "Nebengruppe");
    }
```

```java
    @Override
    public boolean equals(Object obj) {
            if (!(obj instanceof Element))
                    return false;
            return ((Element) obj).getOrdinal() == ordinal;
    }

    public String getName() {
            return name;
    }

    public void setName(String name) {
            this.name = name;
    }

    public String getSymbol() {
            return symbol;
    }

    public void setSymbol(String symbol) {
            this.symbol = symbol;
    }

    public int getOrdinal() {
            return ordinal;
    }

    public void setOrdinal(int ordinal) {
            this.ordinal = ordinal;
    }

    public char getShell() {
            return shell;
    }

    public void setShell(char shell) {
            this.shell = shell;
    }

    public int getPhase() {
            return phase;
    }

    public void setPhase(int phase) {
            this.phase = phase;
    }

    public boolean isGroup() {
            return group;
    }

    public void setGroup(boolean group) {
            this.group = group;
    }
}
```

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 */
public class Metal extends Element {

    private boolean metalloid;
    private double conductivity;

    public Metal() {
    }

    public Metal(String name, String symbol, int ordinal, char shell, int
phase, boolean group, boolean metalloid, double conductivity) {
        super(name, symbol, ordinal, shell, phase, group);
        this.metalloid = metalloid;
        this.conductivity = conductivity;
    }

    @Override
    public String toString() {
      return super.toString() + (metalloid ? ", Halbleiter" : "") +
                ", \u03C3: " + conductivity;
    }

    public boolean isMetalloid() {
        return metalloid;
    }

    public void setMetalloid(boolean metalloid) {
        this.metalloid = metalloid;
    }

    public double getConductivity() {
        return conductivity;
    }

    public void setConductivity(double conductivity) {
        this.conductivity = conductivity;
    }

}
```

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 */
public class PeriodicTable {

    private Element[] elements = new Element[119];

    public PeriodicTable() {
    }

    public void addElement(Element e) {
        if (! hasElement(e.getOrdinal()))
            elements[e.getOrdinal()] = e;
    }

    public boolean hasElement(int o) {
        return elements[o] != null;
    }

    public Element getElement(int o) {
        return elements[o];
    }

    public Element[] getMetals() {
        int countMetals = 0;
        for (Element e : elements)
            if (e != null && e instanceof Metal)
                countMetals++;
        Element[] result = new Element[countMetals];
        int pos = 0;
        for (Element e : elements)
            if (e != null && e instanceof Metal)
                result[pos++] = e;
        return result;
    }

    // Fortsetzung s. nächste Seite!
```

```java
    public static void main(String[] args) {
        PeriodicTable pt = new PeriodicTable();
        pt.addElement(new Element("Wasserstoff", "H", 1, 'K', Element.GAS,
                    Element.MAIN));
        pt.addElement(new Element("Helium", "He", 2, 'K', Element.GAS,
                    Element.MAIN));
        pt.addElement(new Metal("Natrium", "Na", 11, 'M', Element.SOLID,
                    Element.MAIN,false,21E6));
        pt.addElement(new Metal("Eisen", "Fe", 26, 'N', Element.SOLID,
                    Element.SIDE,false,10.02E6));
        pt.addElement(new Metal("Germanium", "Ge", 32, 'N', Element.SOLID,
                    Element.SIDE,true,1.45));
        pt.addElement(new Element("Brom", "Br", 35, 'N', Element.LIQUID,
                    Element.MAIN));
        pt.addElement(new Metal("Tellur", "Te", 52, 'O', Element.SOLID,
                    Element.MAIN,true,0.005));
        pt.addElement(new Metal("Gold", "Au", 79, 'P', Element.SOLID,
                    Element.SIDE,false,44E6));

        System.out.println("Elemente:");
        for(Element e : pt.elements)
            if (e != null)
                System.out.println(e);

        System.out.println("\nMetalle:");
        for(Element e : pt.getMetals())
            System.out.println(e);

        System.out.println("\nGold:");
        System.out.println(pt.getElement(79));

    }

}
```