ACS review questions

1. Which pair of particles has the same number of electrons?
   A. F, Mg\(^{2+}\)
   B. Ne, Ar
   C. Br, Se
   D. Al\(^{3+}\), P\(^{3-}\)

2. Which ion has twenty-six electrons?
   A. Cr\(^{2+}\)
   B. Fe\(^{2+}\)
   C. Ni\(^{2+}\)
   D. Cu\(^{2+}\)

3. A typical silicon chip, such as those in electronic calculators, has a mass of 2.3 \times 10^{-4} \text{ g}. Assuming the chip is pure silicon, how many silicon atoms are in such a chip?
   A. 4.9 \times 10^{18}
   B. 1.4 \times 10^{20}
   C. 3.9 \times 10^{21}
   D. 2.6 \times 10^{27}

Chapter 6 material

1. When 68.00 \text{ J} of energy is added to a sample of gallium that is initially at 25 °C, the temperature rises to 38 °C. What is the volume of the sample?

Data for Gallium, Ga
Specific heat = 0.372 \text{ J/(g.C)}
Density = 5.904 g.cm\(^{-3}\)

- A. 2.38 cm\(^3\)
- B. 4.28 cm\(^3\)
- C. 14.1 cm\(^3\)
- D. 31.0 cm\(^3\)

2. Calculate $\Delta H =$ for the chemical reaction

$\text{Cl}_2(g) + \text{F}_2(g) \rightarrow 2\text{ClF}(g)$

Bond Energies, kJ.mol\(^{-1}\)

- F-F = 159
- Cl-Cl = 243
- Cl-F = 255

- A. -147 kJ
- B. -108 kJ
- C. 171 kJ
- D. 912 kJ

3. Find the final temperature when 10.0 grams of aluminum at 130.0 °C mixes with 200.0 grams of water at 25 °C. Assume no water is lost as water vapor.

4. A system undergoes a process consisting of the following two steps:

Step 1: The system absorbs 72 J of heat while 35 J of work is done on it.
Step 2: The system absorbs 35 J of heat while performing 72 J of work.

Calculate $\Delta E$ for the overall process.

5. A 150.0 g sample of a metal at 75.0°C is added to 150.0 g H2O at 15°C. The temperature of the water rises to 18.3 °C. Calculate the specific heat capacity of the metal, assuming that all the heat lost by the metal is gained by the water.
6. Given the following data:

\[
\text{SrO(s) + CO}_2(g) \rightarrow \text{SrCO}_3(s) \quad \Delta H = -234 \text{ kJ}
\]

\[
2\text{SrO(s)} \rightarrow 2\text{Sr(s)} + \text{O}_2(g) \quad \Delta H = +1184 \text{ kJ}
\]

\[
2\text{SrCO}_3(s) \rightarrow 2\text{Sr(s)} + 2\text{C(s, gr)} + 3\text{O}_2(g) \quad \Delta H = +2440 \text{ kJ}
\]

Find the \( \Delta H \) of the following reaction:

\[
\text{C(s, gr) + O}_2(g) \rightarrow \text{CO}_2(g)
\]