CHEM 202

Quiz 1.1

1. a) NH₄Cl  b) NaH₂PO₄  c) AgNO₃

2. \(^4\text{He}_2\), 2 protons, 2 neutrons and 2 electrons

3. The initial point is \(x = h\) and \(p = 0\). The ball hits the ground with velocity \((v_0 = \sqrt{2gh})\) and instantaneously changes direction as it collides with the ground. It bounces back with some velocity to reach height \(h\) again.

![Diagram](attachment:image.png)

Quiz 1.2

1. \(\text{P} \quad \text{O} \quad \text{O} \quad \text{O}\)

Violate condition

\(\text{PdCl}_2\)

\(\text{Molar mass of palladium chloride is } 172.3 \text{ g/mol}\)

\(n = \frac{177.3}{172.3} \approx 1\)

\(\text{Molar formula is } \text{PdCl}_2\)
2. $x=p$ plot for a pendulum.

3. 1.5 g Pd : 1 g Cl

Atomic mass  

$\text{Pd} : 106.4 \text{ g/mol}$  

$\text{Cl} : 35.45 \text{ g/mol}$

$$\frac{1.5 \text{ g Pd}}{106.4 \text{ g/mol}} = 0.0141 \text{ mol Pd}$$

$$\frac{1 \text{ g Cl}}{35.45 \text{ g/mol}} = 0.0282 \text{ mol Cl}$$

For every 0.0141 mol Pd, there is 0.0282 mol Cl. As for every 1 mol Pd, there is 2 mol Cl.

Empirical formula: $(\text{PdCl}_2)_n$

Molar mass of empirical formula

$$106.4 + 2(35.45) = 177.3 \text{ g/mol}.$$

Molar mass of palladium chloride is 177.3 g/mol.

$$n = \frac{177.3}{177.3} = 1$$

Molecular formula $= \text{PdCl}_2$
1. \[ \Delta x = 1 \times 10^{-4} \text{ m} \]
\[ \Delta x \Delta \rho \geq h \Rightarrow \Delta \rho \geq \frac{h}{\Delta x} \]
\[ \Delta \rho \geq \frac{6.626 \times 10^{-34} \text{ Js}}{1 \times 10^{-4} \text{ m}} = 6.626 \times 10^{-30} \text{ kg m/s} \]

\[ \Delta \rho = \frac{m v \Delta \nu}{m v} \Rightarrow \Delta \nu = \frac{\Delta \rho}{m v} = \frac{6.626 \times 10^{-30}}{9.109 \times 10^{-31}} = 7.2 \]

2.
- \( \text{NO}_3^- \) Nitrate
- \( \text{CO}_3^{2-} \) Carbonate
- \( \text{SO}_4^{2-} \) Sulfate
- \( \text{PO}_4^{3-} \) Phosphate
- \( \text{Mg}^{2+} \) Magnesium Cation
- \( \text{I}^- \) Iodide

3. Diagram showing velocity vectors and conservation of momentum.