"Moles, Grams & Molecules" Solutions

PROCEDURE 1:

Item	1. Mass per Dozen	2. Dozens in 15 Grams	3. Mass of 2 Dozen	4. Dozens per 36 pieces	5. Mass 1 piece
Small paperclips	5.2 – 5.8 grams	Average 2.73	10.4 – 11.6 grams	3	0.43 – 0.48 grams
Large paperclips	12.1 – 12.4 grams	Average 1.22	21.2 – 24.8 grams	3	1.01 – 1.03 grams
Small nuts	13.7 – 13.8 grams	Average 1.09	27.4 – 27.6 grams	3	1.14 – 1.15 grams
Large nuts	36.8 – 37.0 grams	Average 0.41	73.6 – 74 grams	3	3.07 – 3.08 grams

2. Example: $15 \text{ grams} \times \frac{1 \text{ dozen}}{5.2 \text{ grams}} =$ **2.88 dozen**

3. Example: $\frac{5.2 \text{ grams}}{\text{dozen}} \times 2 \text{ dozen} =$ **10.4 grams**

5. Example: $\frac{5.2 \text{ grams}}{\text{dozen}} \times \frac{1 \text{ dozen}}{12 \text{ pieces}} = \frac{\textbf{0.43 grams}}{\textbf{piece}}$

QUESTIONS

1. No.
2. Yes.

PROCEDURE 2:

Element	Mass per Mole	Moles in 50 grams	# Moles per 1.806×10^{24} pieces	Mass 1 Atom
Aluminum	27 grams	1.85	3	4.49×10^{-23}
Iron	56 grams	0.89	3	9.30×10^{-23}
Helium	4 grams	12.5	3	66.4×10^{-23}

2. Example: $50 \text{ grams} \times \frac{1 \text{ mole}}{27 \text{ grams}} =$ **1.85 moles**

3. Example: $2 \text{ moles Al} \times \frac{27 \text{ grams}}{\text{mole}} =$ **54 grams**

4. Example: 1.806×10^{24} atoms x $\dfrac{1 \text{ mole}}{6.02 \times 10^{23} \text{ atoms}}$ = **3**

5. Example: $\dfrac{27 \text{ grams Al}}{1 \text{ mole Al}}$ x $\dfrac{1 \text{ mole Al}}{6.02 \times 10^{23} \text{ atoms Al}}$ = $\mathbf{4.49 \times 10^{-23}\ \dfrac{grams}{atom}}$

QUESTIONS:

1. No.
2. Yes.

GENERAL QUESTIONS.

1. $6.02 \text{ X } 10^{23}$

2a. 24 grams of C is 2 moles of carbon, so we need 2 moles of Na to have the same number of atoms because each mole has 6.02×10^{23} atoms. 2 moles of Na has **46 grams**.

2b. 6 moles of helium has 24 grams. Since 1 mole of carbon has 12 grams, we need **2 moles** of carbon to have 24 grams of carbon.

3a. T 1 mole of anything has the same number of atoms.

3b. F 1 mole of Na is 23 grams, 1 mole of K is 39 grams (see periodic table)

3c. F Since 1 mole of each has a different mass, 1 atom of each will have a different mass.

3d. T A 10 gram sample of anything has 10 grams of mass.

3e. F Think about having 10 grams of small paperclips and 10 grams of large nuts; you would have a different number of each in the 10 grams.

$$10 \text{ grams Na} \times \frac{1 \text{ mole}}{23 \text{ grams}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mole}} = \mathbf{2.6 \times 10^{23} \text{ atoms Na}}$$

$$10 \text{ grams K} \times \frac{1 \text{ mole}}{39 \text{ grams}} \times \frac{6.02 \times 10^{23} \text{ atoms}}{1 \text{ mole}} = \mathbf{1.5 \times 10^{23} \text{ atoms Na}}$$