

March 5, 2009

All work must be shown to receive credit. Avogadro's number  $6.022 \times 10^{23}/\text{mol}$

1. (4 points) In what ways are isotopes alike?

Same number of protons  
Same physical and chemical properties except mass

In what ways are they different?

Different numbers of neutrons  
Different atomic masses

2. (4 points) Give the correct name or formula for the following compounds

IUPAC Name	Formula
Titanium(III) sulfate	$\text{Ti}_2(\text{SO}_4)_3$
Aluminum hypobromite	$\text{Al}(\text{BrO})_3$
Sodium phosphite	$\text{Na}_3\text{PO}_3$
Chromium(II) hydroxide	$\text{Cr}(\text{OH})_2$

3. (3 points) Calculate the number of moles of molybdenum that contain  $3.54 \times 10^{21}$  atoms of molybdenum

$$? \text{ mol Mo} = 3.54 \times 10^{21} \text{ atoms Mo} \times \frac{1 \text{ mol Mo}}{6.022 \times 10^{23} \text{ atom Mo}} = 0.00588 \text{ mol Mo}$$

4. (3 points) Calculate the mass of 3.87 moles of platinum.

$$? \text{ g Pt} = 3.87 \text{ mol Pt} \times \frac{195.1 \text{ g Pt}}{1 \text{ mol Pt}} = 755 \text{ g Pt}$$

5. (3 points) Calculate the molar mass of sodium oxalate, ( $\text{Na}_2\text{C}_2\text{O}_4$ )

$$2 \left( \frac{22.99 \text{ g}}{\text{mol}} \right) + 2 \left( \frac{12.01 \text{ g}}{\text{mol}} \right) + 4 \left( \frac{16.00 \text{ g}}{\text{mol}} \right) = 134.0 \text{ g/mol}$$

6. (3 points) Calculate the number of atoms of carbon in 3.50 mol of sodium oxalate.

$$\begin{aligned} ? \text{ atom C} &= 3.50 \text{ mol Na}_2\text{C}_2\text{O}_4 \times \frac{6.022 \times 10^{23} \text{ molec Na}_2\text{C}_2\text{O}_4}{1 \text{ mol Na}_2\text{C}_2\text{O}_4} \times \frac{2 \text{ atom C}}{1 \text{ molec Na}_2\text{C}_2\text{O}_4} \\ &= 4.21 \times 10^{24} \text{ atoms C} \end{aligned}$$

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1. (4 points) In what ways are isotopes alike?

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2. (4 points) Give the correct name or formula for the following compounds

IUPAC Name	Formula
Cobalt(III) sulfate	$\text{Co}_2(\text{SO}_4)_3$
Aluminum perbromate	$\text{Al}(\text{BrO}_4)_3$
Potassium phosphite	$\text{K}_3\text{PO}_3$
Copper(II) hydroxide	$\text{Cu}(\text{OH})_2$

3. (3 points) Calculate the number of moles of molybdenum that contain  $7.32 \times 10^{21}$  atoms of molybdenum

$$? \text{ mol Mo} = 7.32 \times 10^{21} \text{ atoms Mo} \times \frac{1 \text{ mol Mo}}{6.022 \times 10^{23} \text{ atom Mo}} = 0.0122 \text{ mol Mo}$$

4. (3 points) Calculate the mass of 4.64 moles of platinum.

$$? \text{ g Pt} = 4.64 \text{ mol Pt} \times \frac{195.1 \text{ g Pt}}{1 \text{ mol Pt}} = 905 \text{ g Pt}$$

5. (3 points) Calculate the molar mass of sodium oxalate, ( $\text{Na}_2\text{C}_2\text{O}_4$ )

$$2 \left( \frac{22.99 \text{ g}}{\text{mol}} \right) + 2 \left( \frac{12.01 \text{ g}}{\text{mol}} \right) + 4 \left( \frac{16.00 \text{ g}}{\text{mol}} \right) = 134.0 \text{ g/mol}$$

6. (3 points) Calculate the number of atoms of carbon in 2.96 mol of sodium oxalate.

$$\begin{aligned} ? \text{ atom C} &= 2.96 \text{ mol Na}_2\text{C}_2\text{O}_4 \times \frac{6.022 \times 10^{23} \text{ molec Na}_2\text{C}_2\text{O}_4}{1 \text{ mol Na}_2\text{C}_2\text{O}_4} \times \frac{2 \text{ atom C}}{1 \text{ molec Na}_2\text{C}_2\text{O}_4} \\ &= 3.56 \times 10^{24} \text{ atoms C} \end{aligned}$$