Clicker Questions: Monday, October 29

1) Which statement is false?
   A) "1 mole = 6.022 x 10^{23} things" in the same way that "1 dozen = 12 things".
   B) Another name for the "mole" is "Avogadro's number".
   C) Avogadro's number converts between the number of moles of a substance and the number of atoms.
   D) Molar mass can be used to directly convert between the mass of a sample and the number of atoms present in the sample.
   E) The numerical value of the mole is equal to the number of atoms in exactly 12 g of pure carbon-12.
   F) An element's molar mass tells us the mass of 1 mole of atoms of that element.

2) Calculate the number of moles of Br if you have 1.06 x 10^{24} Br atoms.
   A) 1.76 mol Br  
   B) 1.760 mol Br  
   C) 1.76 x 10^{24} mol Br  
   D) 1.760 x 10^{46} mol Br  
   E) 6.38 x 10^{47} mol Br  
   F) 6.383 x 10^{47} mol Br

3) What is the mass, in g, of 3.97 x 10^{20} Kr atoms
   A) 6.59 x 10^{-4} g Kr  
   B) 5.52 x 10^{44} g Kr  
   C) 3.33 x 10^{22} g Kr  
   D) 0.0333 g Kr  
   E) 6.59 x 10^{42} g Kr  
   F) 0.0552 g Kr

4) Burning coal is a major source of added atmospheric CO\textsubscript{2}, a greenhouse gas. Assuming a sample of coal is pure carbon, how many carbon atoms are in a 41 kg sample of coal?
   A) 2.06 x 10^{21} C atoms  
   B) 2.1 x 10^{21} C atoms  
   C) 2.5 x 10^{22} C atoms  
   D) 3.0 x 10^{23} C atoms  
   E) 2.96 x 10^{23} C atoms  
   F) 2.06 x 10^{24} C atoms  
   G) 2.1 x 10^{27} C atoms

5) A sample of Ne contains 5.4 x 10^{21} atoms. What is the volume of the sample in mL? The density of Ne is 0.90 g/L.
   A) 1.6 x 10^{2} Ne  
   B) 1.6 x 10^{48} Ne  
   C) 2.0 x 10^{48} mL Ne  
   D) 2.0 x 10^{2} mL Ne  
   E) 0.49 mL Ne  
   F) 4.9 x 10^{45} Ne

Answers: 1) D  2) A*  3) F*  4) G*  5) D*  
* See answer worked out on next page
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Selected answers with work shown

2) Calculate the number of moles of Br if you have 1.06 x 10^{24} Br atoms.

**Answer:** Flowchart: atoms Br → moles Br

\[
(1.06 \times 10^{24} \text{ Br atoms}) \left( \frac{1 \text{ mol Br}}{6.022 \times 10^{23} \text{ Br atoms}} \right) = 1.760212554 \text{ mol Br} = 1.76 \text{ mol Br}
\]

3sf 4sf (keep 3sf)

3) What is the mass, in g, of 3.97 x 10^{20} Kr atoms

**Answer:** Flowchart: # atoms Kr → moles Kr → g Kr

\[
(3.97 \times 10^{20} \text{ Kr atoms}) \left( \frac{1 \text{ mol Kr}}{6.022 \times 10^{23} \text{ Kr atoms}} \right) \left( \frac{83.80 \text{ g Kr}}{1 \text{ mol Kr}} \right) = 0.0552 \text{ g Kr}
\]

3sf 4sf 4sf (keep 3sf)

4) Burning coal is a major source of added atmospheric CO\(_2\), a greenhouse gas. Assuming a sample of coal is pure carbon, how many carbon atoms are in a 41 kg sample of coal?

**Answer:** kg C → g C → moles C → atoms C

\[
(41 \text{ kg C}) \left( \frac{10^3 \text{ g C}}{1 \text{ kg C}} \right) \left( \frac{1 \text{ mol C}}{12.01 \text{ g C}} \right) \left( \frac{6.022 \times 10^{23} \text{ C atoms}}{1 \text{ mol C}} \right) = 2.055803467 \times 10^{27} \text{ C atoms}
\]

2sf 4sf 4sf

= 2.1 \times 10^{27} \text{ C atoms} (keep 2sf)

5) A sample of Ne contains 5.4 x 10^{21} atoms. What is the volume of the sample in mL? The density of Ne is 0.90 g/L.

**Answer:** # Ne atoms → moles Ne → g Ne → L Ne → mL Ne

\[
5.4 \times 10^{21} \text{ Ne atoms} \cdot \frac{1 \text{ mol Ne}}{6.022 \times 10^{23} \text{ Ne atoms}} \cdot \frac{20.18 \text{ g Ne}}{1 \text{ mol Ne}} \cdot \frac{1 \text{ L}}{0.90 \text{ g}} \cdot \frac{1 \text{ mL}}{10^{-3} \text{ L}} = 2.0 \times 10^2 \text{ mL Ne}
\]

2sf 4sf 4sf 2sf (keep 2sf)