

CH301 Worksheet 1: High School Chemistry Questions.

For each problem, identify the kind of question BEFORE answering it.

1. A 25 kg ball has a kinetic energy of 225 J. What is the speed of the ball?
What kind of question is this? _____
2. How many molecules of water are there in 100 mL of water? (The density of water = 1.000 g/mL.)
What kind of question is this? _____
3. Given that the atomic mass of carbon is given as 12.0107 g/mol, what are the approximate relative abundances of the two isotopes ^{12}C and ^{13}C ? **What kind of question is this?** _____
4. In the electrolysis of $2\text{H}_2\text{O} \rightarrow 2\text{H}_2 + \text{O}_2$, how many atom of O in O_2 are made from 4 g of H_2O ?
What kind of question is this? _____
5. What are the most likely ionic forms of (a) sodium and (b) calcium?
What kind of question is this? _____
6. What is the product of a reaction between metallic lithium and oxygen, O_2 ?
What kind of question is this? _____
7. Name the following species: (a) Cl^- , (b) NO_3^- , (c) C_3H_8 . **What kind of question is this?** _____
8. The combustion of ethanol has the following equation: $\text{C}_2\text{H}_5\text{OH} + 3 \text{O}_2 \rightarrow 2 \text{CO}_2 + 2 \text{H}_2\text{O}$
What mass of CO_2 is formed from 1 kg of ethanol? **What kind of question is this?** _____
9. Vitamin K contains 78.95% C, 3.95% H, and 21.05% O by mass. What is its empirical formula?
What kind of question is this? _____
10. Given that vitamin K (see question 9) has molecular weight of 158.15 g/mol, what is its molecular formula? **What kind of question is this?** _____

11. When sand is stirred up in a glass of water a (homogeneous or heterogeneous?) mixture is formed.
What kind of question is this? _____
12. If 10.0 g of hydrochloric acid is dissolved in enough water to make 1.00 liter of solution, what is the molarity of the solution? *What kind of question is this?* _____
13. Balance the following chemical equation: _____ BCl_3 + _____ H_2O \rightarrow _____ B(OH)_3 + _____ HCl
What kind of question is this? _____
14. A microwave oven used radiation at a frequency of 2450 MHz to vibrationally excite water molecules in food. What is the wavelength of this radiation? *What kind of question is this?* _____
15. How many protons, neutrons, and electrons are in the most common atomic form of chlorine?
What kind of question is this? _____
16. If 75 mL of water is added to 25 mL of 1 M H_2SO_4 in water, what is the new concentration of H_2SO_4 ?
What kind of question is this? _____
17. Classify the following properties of matter as physical or chemical: (a) color, (b) flammability, (c) density. *What kind of question is this?* _____
18. Rank the following four forms of electromagnetic radiation in terms of decreasing energy: Microwave, X-ray, radiofrequency, yellow light. *What kind of question is this?* _____
19. Which of the following is *not* a strong acid: HI, H_2SO_4 , HCl, or HNO_2 ?
What kind of question is this? _____
20. What is the oxidation number of nitrogen in nitrate?
What kind of question is this? _____