

CHM1045 Practice Q & A

1. A tentative explanation for a set of observations that can be tested by further experimentation is referred to as:
 - a. A theory
 - b. A law
 - c. A hypothesis
 - d. None of the above
2. Atoms of the same element with different mass numbers are called
 - a. Ions
 - b. Neutrons
 - c. Groups
 - d. Isotopes
3. Complete the following chart:

	Atomic Number	Protons	Electrons
Al^{3-}			
S^{2-}			

4. Write the empirical formula: $\text{C}_5\text{H}_{14}\text{O}$
5. Write the formula: Rubidium nitrite
6. Write the empirical formula: $\text{C}_{10}\text{H}_{22}\text{O}_2$
7. Write the formula: Lead (II) Carbonate
8. Name the compound: KOH
9. Write the formula: Calcium hydrogen phosphate
10. Name the compound: KMnO_4
11. Name the compound: $\text{FeCl}_3 \cdot 6\text{H}_2\text{O}$
12. Is temperature an extensive or intensive property?
13. Is sodium an alkali metal or alkaline earth metal?
14. Hydrogen gas burns in oxygen gas to form water. Is hydrogen burning a physical or chemical property?
15. What isotope is used as the standard in establishing the atomic mass scale?
16. Liquid nitrogen boils at -195.8°C . Express the boiling point of liquid nitrogen in kelvin.
17. The average distance from Earth to the sun is 9.3×10^7 miles. How many kilometers is this? Express your answer in scientific notation.
18. Complete the following chart:

Atom/Ion	$^{14}\text{N}^{3-}$	^{195}Pt	
Protons			26
Neutrons			28
Electrons			24
19. Bromine is extremely dense with density = $3.10\text{g}/\text{cm}^3$. How many liters will 2.12g of bromine occupy?
20. Write the formula for the compound: Magnesium nitride
21. Name the compound: $\text{K}_2\text{CO}_3 \cdot 2\text{H}_2\text{O}$

22. Chlorine exists mainly as two isotopes: ^{35}Cl and ^{37}Cl with atomic masses of 24.968 amu and 36.956 amu, respectively. Calculate the average atomic mass of chlorine knowing that ^{35}Cl isotope is 75.53% abundant?
23. Combustion analysis of 0.9437 gram sample of the compound ferrocene gave 2.233 grams of CO_2 and 0.457 grams of H_2O . Ferrocene is composed of C, H, and Fe. What is the empirical formula of ferrocene?
24. Which of the following compounds is a strong electrolyte?
- H_2O
 - Glucose ($\text{C}_6\text{H}_{12}\text{O}_6$)
 - NaCl
 - Acetic acid (CH_3COOH)
25. What is the oxidation number of Cr in $\text{Cr}_2\text{O}_7^{2-}$?
26. Consider the following redox reaction:
- $$\text{Mg (s)} + 2\text{H}_2\text{O (l)} \rightarrow \text{Mg(OH)}_2 \text{ (aq)} + \text{H}_2 \text{ (g)}$$
- Assign oxidation numbers to the following elements
 Reactants: Mg _____ H _____
 Products: Mg _____ H (in H_2) _____
 - Which reactant is oxidized?
27. Determine the number of hydrogen atoms that are present in 25.6 grams of $(\text{NH}_4)_3\text{PO}_4$
28. Determine the amount of heat in (kJ) given off when 1.26×10^4 g of NO_2 are produced according to the equation:
- $$2 \text{NO (g)} + \text{O}_2 \text{ (g)} \rightarrow 2 \text{NO}_2 \text{ (g)} \quad \Delta H = -114.6 \text{ kJ/mol}$$
29. When 0.1375g sample of solid magnesium is burned in a constant-volume bomb calorimeter, the temperature of the calorimeter rises from 25.0°C to 26.2°C .
- Is the combustion of magnesium endothermic or exothermic?
 - If the heat capacity of the calorimeter is $3024 \text{ J}/^\circ\text{C}$, calculate the heat of reaction for the combustion of 0.1375g of Mg.
 - What is the change of energy when 1 mole of Mg is burned?
30. CO_2 gas effuses into an evacuated chamber in 48 seconds. An unknown gas effuses into the same chamber in 34 seconds. Determine the molar mass of the unknown gas.
31. For a hydrogen atom, the energy of $3p$ orbital is (circle one)
 Lower than the same as higher than the energy of $3s$ orbital
32. Which of the following atoms would you expect to have the largest first ionization energy?
- Cs
 - Li
 - Na
 - Rb
33. Which of the following atoms/ions is isoelectronic with O^{2-} ? Circle all that apply.
- Ne
 - Na^+
 - F

34. Which of the following has the largest atomic radius?

- a. N
- b. Si
- c. P