Chem 2202 Midterm Review Questions

Q1. Complete table as indicated.

Element	isotope symbol	Atomic #	Mass #	#p	#e	#n
Carbon-12						
			24	***12***		
			26	***12***	***10***	
Chlorine - 35						
				17	***18***	***20***
	Ca^{2+}		40			
	P^{3-}					***16***
			34	16	18	
		13			10	14

2. Given

Isotope	Atomic Mass (μ)	% abundance
potassium - 39	38.96	93.3
potassium - 41	40.96	??

a) What is the percent abundance of potassium - 41?
b) Calculate the average atomic mass of potassium?

3. Given

Isotope	Atomic Mass (μ)	% abundance
chlorine -35	34.97	??
chlorine -37	36.97	??

a) What does the periodic table tell you the average atomic mass of chlorine is?
b) Calculate the percent abundance of each isotope.

4. Given

Isotope	Atomic Mass (μ)	% abundance
lithium - 6	6.015	7.6 %
lithium - 7	??	??

a) What does the periodic table say the average atomic mass of lithium is?
b) What is the percent abundance of lithium - 7?
c) Calculate the atomic mass of lithium - 7.

5. How many molecules of methane are in 25.0 g?

6. What mass does 1.57×10^{21} formula units of **sodium carbonate** have?

7. If you have 3.85×10^{26} molecules of sulfur hexafluoride, how many grams is this?

8. How many atoms are in 2.38 g of copper metal?

9. How many formula units are in 15.5 g of potassium phosphate?

10. What mass does 4.58×10^{22} atoms of iron have?

11. Calculate the % composition of iron (III) oxide dihydrate.

12. What is the molecular formula of a compound, given it is 40.0% carbon, 6.73% hydrogen and 53.3% oxygen. The molar mass of the compound is 180.18 g/mol.

13. What is the molecular formula of a compound, given it is 49.3% carbon, 6.91% hydrogen and 43.8% oxygen. The molar mass of the compound is 438.48 g/mol.

14. Heating 9.24 g of a chloride of tin results in 5.78 g of tin metal remains. What is the formula for this chloride of tin?

15. What is the formula for hydrated nickel (II) chloride if after heating 15.82 g of the hydrate, 8.61 g of the anhydrous salt remains?

16. What volume will 28.3 g of carbon dioxide gas occupy at STP?

17. What mass will 68.4 L of nitrogen gas have at STP?

18. 0.502 g of a gas occupies 134 mL at STP. What is the molar mass of the gas? Which noble gas it is?

19. Calculate the number of neon atoms present in a 1.50 L sample at STP.

20. What volume does 6.85×10^{21} molecules of nitrogen dioxide occupy at STP?

21. A car battery terminal protective coating can be prepared by dissolving 18.5 g of sodium silicate in water to make 150.0 mL of solution. What is the molar concentration of the solution?

22. Sodium silicate is one of the chemicals used to prepare a water softener for dishes and laundry. What mass of sodium silicate is necessary to prepare 8.0 L of a 0.0250 mol/L water softening solution?

23. A 0.560 mol/L solution of sodium phosphate makes an efficient cleaner for old brushes hardened with paint. What volume of the solution can be prepared from 86.9 g of Na_3PO_4?

24. The molar concentration of concentrated ammonia is 14.8 mol/L. What volume of concentrated aqueous ammonia is required by a consumer to prepare 2.0 L of 0.70 mol/L household ammonia?

25. A safe concentration for most toxic substances 1.00×10^{-6} mol/L. To what volume must the 50.0 L of 3.50 mol/L solution be diluted to make the safe concentration?

26. What would be the concentration of nitric acid solution prepared by diluting 25.0 mL of concentrated nitric acid (15.9 mol/L) to a volume of 10.0 L?