PRACTICE FREE RESPONSE THAT WILL BE HELPFUL TO STUDY FOR CHEMISTRY NCFE

1. Explain, in terms of electron configuration, why arsenic and antimony are chemically similar.

2. Identify the element in Period 3 that is an unreactive gas at STP.

3. Compare the energy of an electron in the first energy level of a cadmium atom to the energy of an electron in the third energy level of the same atom.

Use the information below to answer questions 4 and 5.

The densities for two forms of carbon at room temperature are listed in the table below.

Element Form	Density (g/cm^3)
Carbon (graphite)	2.2
Carbon (diamond)	3.513

4. Compare the number of carbon atoms in a 0.30 cm^3 sample of graphite and a 0.30 cm^3 sample of diamond.

5. A student calculated the density of a sample of graphite to be 2.3 g/cm^3. Show the numerical setup for calculating the student's percent error for the density of graphite.

Use the following information to answer questions 6 and 7.

A sample of calcium carbonate, $CaCO_3$, has a mass of 42.2 grams. Calcium carbonate has a molar mass of 100. g/mole.

6. Show a numerical setup for calculating the number of moles in the sample of $CaCO_3$.

7. Determine the percent composition by mass of oxygen in the $CaCO_3$.

Base your answers to questions 8 and 9 on the information below and your knowledge of chemistry.

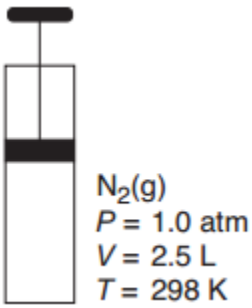
Carbon monoxide, CO (g), is a toxic gas found in automobile exhaust. The concentration of CO (g) can be decreased by using a catalyst in the reaction between CO (g) and O_2 (g). This reaction is represented by the balanced equation below.

$$2\ CO\ (g) + O_2\ (g) \xrightarrow{\text{catalyst}} 2\ CO_2\ (g) + \text{energy}$$

8. Explain, in terms of collision theory, why an increase in temperature increases the rate of the reaction.

9. Draw a potential energy curve for the reaction represented by this equation.

The diagram and data below represent a gas and the conditions of pressure, volume, and temperature of the gas in a rigid cylinder with a moveable piston.



10. Determine the volume of the gas in the cylinder at STP.

11. State one change in temperature and one change in pressure that will cause the gas in the cylinder to behave more like an ideal gas.

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Use the information below to answer questions 12 through 15.

During a titration, 10.00 mL of acetic acid, $HC_2H_3O_2$ (aq), is completely neutralized by adding 12.50 mL of 0.64 M sodium hydroxide, NaOH (aq).

12. Identify the only positive ion in the $HC_2H_3O_2$ (aq).

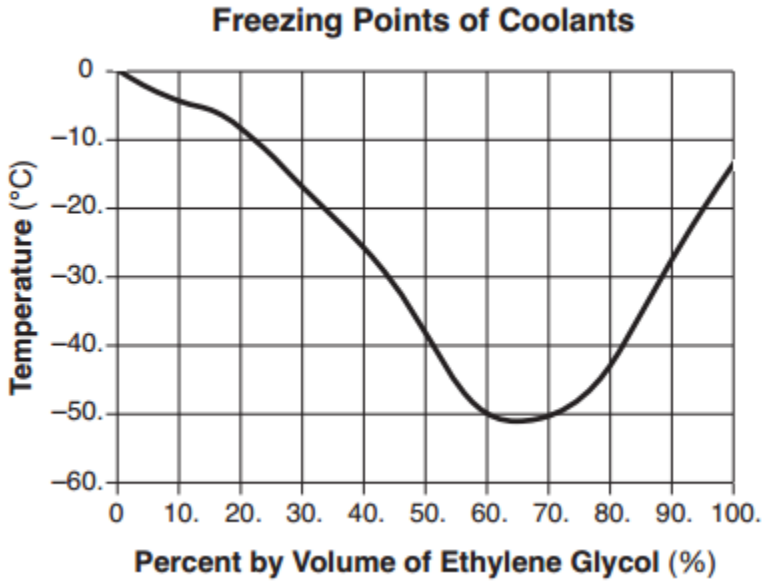
13. State the number of significant figures used to express the volume of acetic acid.

14. Determine the molarity of the acetic acid.

15. Explain why it is better to use data from multiple trials to determine the molarity of acetic acid, rather than data from a single trial.

Base your answers to questions 16 through 19 on the information below and your knowledge of chemistry.

A solution of ethylene glycol and water can be used as the coolant in an engine-cooling system. The ethylene glycol concentration in a coolant solution is often given as percent by volume. For example, 100. mL of a coolant solution that is 40.% ethylene glycol by volume contains 40. mL of ethylene glycol diluted with enough water to produce a total volume of 100. mL. The graph below shows the freezing point of coolants that have different ethylene glycol concentrations.



16. Explain, in terms of particle distribution, why a coolant solution is a homogeneous mixture.

17. Explain, in terms of the molecular polarity, why ethylene glycol dissolves in water to form a solution.

18. Identify the percent by volume of ethylene glycol in a solution that freezes at -10.°C.

19. One engine-cooling system has a volume of 6400 mL. Determine the volume of ethylene glycol in the completely filled engine-cooling system when the concentration of ethylene glycol is 50.% by volume.

PRACTICE FREE RESPONSE THAT WILL BE HELPFUL TO STUDY FOR CHEMISTRY NCFE

The radioisotope Mo-99 naturally decays to produce the metastable isotope Tc-99m, which is used in medical diagnosis. A doctor can obtain images of organs and bonds by injecting a patient with a solution of Tc-99m. The half-life of the metastable Tc-99m is six hours.

20. Write the complete nuclear equation for the decay of Mo-99.

21. State both the number of protons and the number of neutrons in a Tc-99 nuclide.

22. Determine the fraction of an original sample of metastable Tc-99m that remains unchanged after 24 hours.

Get the answers to these review questions!