

CHEMISTRY AP PRETEST

All questions are generated from material covered in Chemistry I Honors.

- Which of the following elements is the most electronegative?
 - N
 - Cl
 - Ne
 - Mg
 - Rb
- Which element has the most possible oxidation states?
 - N
 - Cl
 - Ne
 - Mg
 - Rb
- Which element has the smallest first ionization energy?
 - N
 - Cl
 - Ne
 - Mg
 - Rb
- BF_3 in the reaction: $\text{BF}_3 + \text{F}^- \rightarrow \text{BF}_4^-$ is
 - Arrhenius acid
 - Bronsted Lowry acid
 - Bronsted Lowry base
 - Lewis acid
 - Lewis base
- About how many mL of 6.0 molar HCl must be diluted to obtain 1.0 L of 2.5 molar HCl?
 - 130 mL
 - 250 mL
 - 400 mL
 - 420 mL
 - 840 mL
- Which of the following represents a pair of isotopes of the same element?

	Atomic #	Mass #
a. I.	92	208
II.	92	211
b. I.	45	106
II.	92	206
c. I.	92	238
II.	89	235
d. I.	92	233
II.	89	233
e. I.	7	15
II.	8	16
- Which of the following processes must exist in equilibrium with the evaporation process when a measurement of vapor pressure is made?
 - fusion
 - vaporization
 - sublimation
 - boiling
 - condensation

8. Which of the following is a conjugate acid – base pair?
- H_3O^+ and OH^-
 - HCl and OCl^-
 - NH_4^+ and NH_3
 - H_2SO_4 and SO_4^{2-}
9. $\text{Mg} + \text{H}_2\text{O} \rightarrow \text{Mg(OH)}_2 + \text{H}_2$
In this reaction, what mass of hydrogen can be produced by a reaction of 4.73 g of Mg with 1.83 g of H_2O ?
- 0.103 g
 - 0.0162 g
 - 0.0485 g
 - 0.219 g
 - 3.20 g
10. Which of the following has an incomplete octet in its Lewis Structure?
- SO_2
 - ICl
 - CO_2
 - F_2
 - NO
11. How many mL of .20 M KOH are needed to completely neutralize 20 mL of 0.10 M H_3PO_4 ?
- 3.0 mL
 - 10 mL
 - 20 mL
 - 30 mL
 - 60 mL
12. Which of the ions below has the largest ionic radius?
- Li
 - Be
 - F
 - Cl
 - Br
13. $\text{Zn (s)} + 2\text{HCl (aq)} \rightarrow \text{ZnCl}_2 \text{ (aq)} + \text{H}_2 \text{ (g)}$
In the reaction, if 32.7 g of zinc is allowed to react completely with excess HCl, how many liters of hydrogen gas will be liberated?
- 5.6 L
 - 11.2 L
 - 22.4 L
 - 33.6 L
 - 44.8 L
14. A crystal of NaCl is
- soft, low melting point and a good electrical conductor
 - hard, high melting point and a good electrical conductor
 - soft, low melting point and a poor electrical conductor
 - hard, high melting point and poor electrical conductor
 - soft, high melting point and poor electrical conductor
15. Several pieces of mossy zinc are added to HCl in a filter flask. A rubber tubing is submerged under water so that the gas can be bubbled through the water and collected in a gas-collection tube. After collecting gas, the pressure in the gas collecting tube is 300 mmHg and the temperature is 20.0°C. If the vapor pressure of water at this temperature is 18 mmHg. What is pressure of H_2 gas?
- 318 mmHg
 - 282 mmHg
 - 320 mmHg

- d. 300 mmHg
e. 18 mmHg
16. Generally the vapor pressure of a liquid is related to
I. the amount of liquid
II. temperature
III. intermolecular forces
a. I only
b. II only
c. III only
d. I and II
e. II and III
17. Each of the following can act as both a Bronsted acid and a Bronsted base except
a. HSO_4^-
b. H_2PO_4^-
c. NH_4^+
d. H_2O
e. HCO_3^-
18. Which of the following violates the octet rule?
a. NF_3
b. IF_3
c. PF_3
d. SbF_3
e. AsF_3
19. A lab instructor is preparing 5.00L of a 0.100 molar $\text{Pb}(\text{NO}_3)_2$ (molecular weight 331) solution. She should weigh out
a. 165.5 g of $\text{Pb}(\text{NO}_3)_2$ and add 5.00 kg of water
b. 165.5 g of $\text{Pb}(\text{NO}_3)_2$ and add water until the solution has a volume of 5.00L
c. 33.1 g of $\text{Pb}(\text{NO}_3)_2$ and add water until the volume of the solution has a volume 5.00L
d. 331 g of $\text{Pb}(\text{NO}_3)_2$ and add 5.00L of water
e. 165.5 g of $\text{Pb}(\text{NO}_3)_2$ and add 5.00L of water
20. Which of the following aqueous solutions has the highest boiling point?
a. 0.10 M NaCl
b. 0.10 M NH_4NO_3
c. 0.10 M NH_4Cl
d. 0.10 M HCl
e. 0.10 M Na_2SO_4
21. A solution containing 292 g of $\text{Mg}(\text{NO}_3)_2$ per liter of solution has a density of 1.108 g/mL. The molality of the solution is
a. 2.00 molal
b. 2.41 molal
c. 5.50 molal
d. 6.39 molal
e. 11.08 molal
22. Ionization Energies for
Unknown Element Q (kJ mol⁻¹)
First Second Third
520 7298 11815
Which element below is most likely to be element Q?
a. Li
b. Ca
c. Al
d. F
e. Ba

23. Carbonated beverages get their fizz from carbon dioxide that is dissolved in water. Under which conditions is it possible to dissolve the most carbon dioxide in water?

- a. high pressure, low temperature
- b. high pressure, low temperature
- c. low pressure, high temperature
- d. low pressure, low temperature
- e. A vacuum, high temperature

24. Determine the *molecular formula* of a compound that contains 40.0% C, 6.71% H, and 53.29% O and has a molecular mass of 60.05.

- a. C₂H₄O₂
- b. CH₂O
- c. C₂H₃O₄
- d. C₂H₂O₄
- e. C₄H₈O₄

25. A gaseous mixture containing 1.5 mol of Ne and 4.5 mol of NO₂ has a total pressure of 8.0 atm. What is the partial pressure of NO₂?

- a. 1.5 atm
- b. 2.7 atm
- c. 4.5 atm
- d. 6.0 atm
- e. 8.0 atm

26. $\text{Si(s)} + 2\text{Cl}_2\text{(g)} \rightarrow \text{SiCl}_4\text{(l)}$

In the reaction, if 3.84 mol Cl₂ react with an excess of Si, how many moles of SiCl₄ will be produced?

- a. 0.96 mol
- b. 1.92 mol
- c. 3.84 mol
- d. 4.00 mol
- e. 5.72 mol

-
- a. ↑↓ ↑↑ ↑
 - b. ↑↓ ↑↓ ↑↓
 - c. ↑↓ ↑↓ ↑↓ ↑↓ ↑↓
 - d. ↑
 - e. ↑↓ ↑↓ ↑

27. Which of the above represents a nonreactive atom?

28. Which of the above violates the Pauli Exclusion Principle?

29. Which of the above violates Hund's Rule?

30. Which of the above represents an atom in an excited state?

- a. freezing
 - b. melting
 - c. sublimation
 - d. condensation
 - e. vaporization
31. According to the above diagram if the temperature increases from 40°C to 60°C at a pressure of 1.5 atm, which of the above process occurs?
32. According to the above diagram if the temperature increases from 20°C to 60°C at a pressure of 0.5 atm, which process is occurring?
33. According to the above diagram if the pressure increases from 0.5 atm to 1.0 atm at 60°C, which of the above process occurs?
34. Which of the following is the safest and most effective procedure to treat a base spill onto skin?
- a. Dry the affected area with paper towels
 - b. Flush area with a dilute solution of HCl
 - c. Flush the affected area with water and then with a dilute NaOH solution
 - d. Flush the affected area with water and then with a dilute NaHCO₃ solution
 - e. Flush the affected area with water and then with a dilute vinegar solution
35. What was the key finding in Rutherford's famous "Gold Foil" experiment?
- a. electrons orbit the nucleus in concentric rings
 - b. all neutrons are located in a central nucleus
 - c. most of the mass of an atom is located in a central, dense core
 - d. atoms are composed of positively and negatively charged particles
 - e. alpha particles are attracted to a negatively charged plate