

HONORS CHEMISTRY – Year in Review

Directions: Read each question carefully and chose the best answer.

- 1) Subatomic particles can usually pass undeflected through an atom because the volume of an atom is composed of
 - a. An uncharged nucleus
 - b. Largely empty space
 - c. Neutrons
 - d. Protons

- 2) What is the total number of electrons in the valence shell of an atom of aluminum in the ground state?
 - a. 8
 - b. 2
 - c. 3
 - d. 10

- 3) Which of these elements has physical and chemical properties most similar to silicon (Si)?
 - a. Germanium (Ge)
 - b. Lead (Pb)
 - c. Phosphorus (P)
 - d. Chlorine (Cl)

- 4) What is the total number of protons in the nucleus of an atom of potassium-42?
 - a. 15)
 - b. 19)
 - c. 39)
 - d. 42)

- 5) If an equation is balanced properly, both sides of the equation must have the same number of ?
 - a. Atoms
 - b. Coefficients
 - c. Molecules
 - d. Moles of molecules

- 6) The correct name for P_2O_5 is?
 - a. Phosphorus (V) pentoxide
 - b. Phosphorus oxide
 - c. Phosphorus (II) oxide
 - d. Diphosphorus pentoxide

- 7) The reaction times for three trials of an experiment are 90.3, 90.2, and 90.5 seconds. Which average time is expressed using the correct number of significant figures?
 - a. 90.3
 - b. 90.33
 - c. 90
 - d. 90.333

- 8) At room temperature, chlorine exists as a gas, bromine exists as a liquid, and iodine exists as a solid. The physical states of these elements indicate that melting point –
- Decreases from top to bottom with group 17 elements
 - Is independent of periodic position
 - Increases from top to bottom within group 17 elements
 - Is constant within group 17 elements

Some Selected Polyatomic Ions

Positive Ions		Negative Ions	
Names	Symbols	Names	Symbols
ammonium	NH_4^+	acetate	CH_3COO^-
mercury (II)	Hg^{2+}	cyanide	CN^-
		oxalate	$\text{C}_2\text{O}_4^{2-}$
		phosphate	PO_4^{3-}
		thiosulfate	$\text{S}_2\text{O}_3^{2-}$

- 9) Using the table of selected polyatomic ions above, what is the correct formula for ammonium phosphate?
- NH_4PO_4
 - $(\text{NH}_4)_2(\text{PO}_4)_3$
 - $(\text{NH}_4)_3(\text{PO}_4)$
 - $(\text{NH}_4)(\text{PO}_4)_3$
- 10) $\text{N}_2 + 3 \text{H}_2 \rightarrow 2 \text{NH}_3$
If 6 liters of hydrogen gas are used, how many liters of nitrogen gas will be needed for the above reaction at STP
- 2 liters
 - 3 liters
 - 4 liters
 - 12 liters
- 11) Formaldehyde (H_2CO) reacts with oxygen to form CO_2 and H_2O . How many moles of CO_2 will be produced from reacting 2 moles of H_2CO with oxygen?
- 1
 - 2
 - 4
 - 8
- 12) The net charge on an aluminum ion is +3 because there are?
- 10 protons and 13 electrons in the atom
 - 13 protons and 10 neutrons in the nucleus
 - 10 neutrons and 13 electrons in the atom
 - 13 protons and 10 electrons in the atom

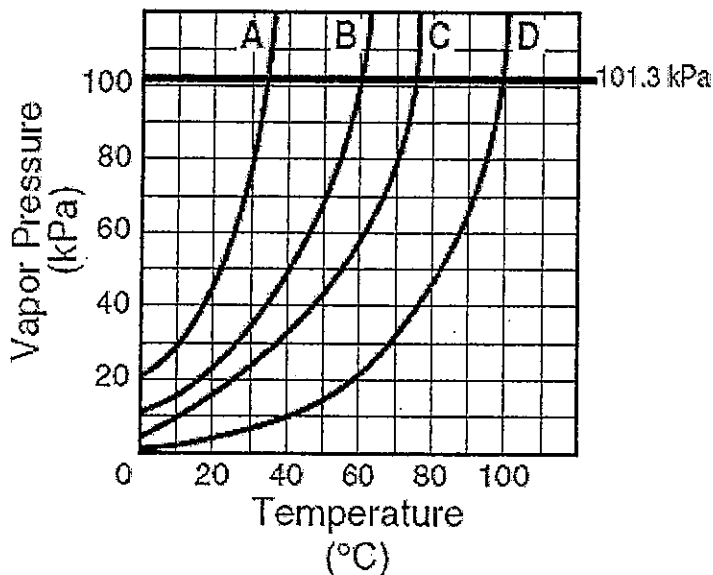
- 19) The correct formula for copper (I) bromide is –
- CuBr
 - CuBr₂
 - Cu₂Br
 - Cu₂Br₃
- 20) What is the total number of hydrogen atoms required to form 1 molecule of C₃H₅(OH)₃?
- 1
 - 5
 - 3
 - 8
- 21) Atoms of which element have the weakest attraction for electrons?
- Na
 - P
 - Si
 - S
- 22) An atom with the electron configuration $1s^2 2s^2 2p^6 3s^2 3p^6 3d^5 4s^2$ has an incomplete
- 2p sublevel
 - Second principle energy level
 - Third principle energy level
 - 4s sublevel
- 23) The ability to conduct electricity in the solid state is a characteristic of metallic bonding. This characteristic is best explained by the presence of:
- High ionization energies
 - High electro negativities
 - Mobile electrons
 - Mobile protons
- 24) When ionic bonds are formed, metallic atoms tend to?
- Lose electrons and become negative ions
 - Lose electrons and become positive ions
 - Gain electrons and become negative ions
 - Gain electrons and become positive ions
- 25) The bond between hydrogen and oxygen in a water molecule is classified as?
- Ionic and nonpolar
 - Ionic and polar
 - Covalent and nonpolar
 - Covalent and polar
- 26) Emission of light from an atom occurs when an electron _____?
- Orbits the nucleus
 - Moves within its atomic orbital
 - Jumps from a lower energy level to a higher energy level
 - Falls from a higher energy level to a lower energy level

27) Which of the following is the balanced chemical equation for the reaction shown below:

Aluminum + Sulfuric acid \rightarrow Aluminum sulfate + Hydrogen gas

- a. $\text{Al} + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2$
- b. $2\text{Al} + 3\text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + 3\text{H}_2$
- c. $2\text{Al} + 3\text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2$
- d. $2\text{Al} + \text{H}_2\text{SO}_4 \rightarrow \text{Al}_2(\text{SO}_4)_3 + \text{H}_2$

28) Line D represents water. If the atmospheric pressure in a flask is lowered to 70 kPa, water would boil at what temperature?



- a. 32°C
- b. 70°C
- c. 92°C
- d. 100°C

29) Rutherford's gold foil experiment resulted in

- a. The description of the electron cloud
- b. The discovery of a small, positively-charged nucleus
- c. The establishment of fixed orbitals, quantized distances from the nucleus where electrons could exist
- d. The rejection of the Bohr model

30) Which of the following is NOT an example of a Chemical Change?

- a. Steam from your shower condenses on the mirror
- b. Water decomposes into hydrogen and oxygen gas
- c. Mixing lead II nitrate and potassium iodide forms a yellow precipitate
- d. You bake a cake



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Key

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- What is the total number of electrons in the valence shell of an atom of aluminum in the ground state?
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- Which of these elements has physical and chemical properties most similar to silicon (Si)?
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Si + Ge in same family.
- What is the total number of protons in the nucleus of an atom of potassium-42?
 - 15
 - 19
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 - 42

Atomic No. = # protons
- If an equation is balanced properly, both sides of the equation must have the same number of?
 - Atoms (of each element)
 - Coefficients
 - Molecules
 - Moles of molecules
- The correct name for P_2O_5 is?
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Covalent! (need prefixes)
- The reaction times for three trials of an experiment are 90.3, 90.2, and 90.5 seconds. Which average time is expressed using the correct number of significant figures?
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$$\begin{array}{r} 90.3 \\ + 90.2 \\ + 90.5 \\ \hline 271.0 / 3 = 90.33 \\ \uparrow \\ \text{HSF!} \end{array}$$

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largest

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d holds 10 e⁻

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Sea of e⁻

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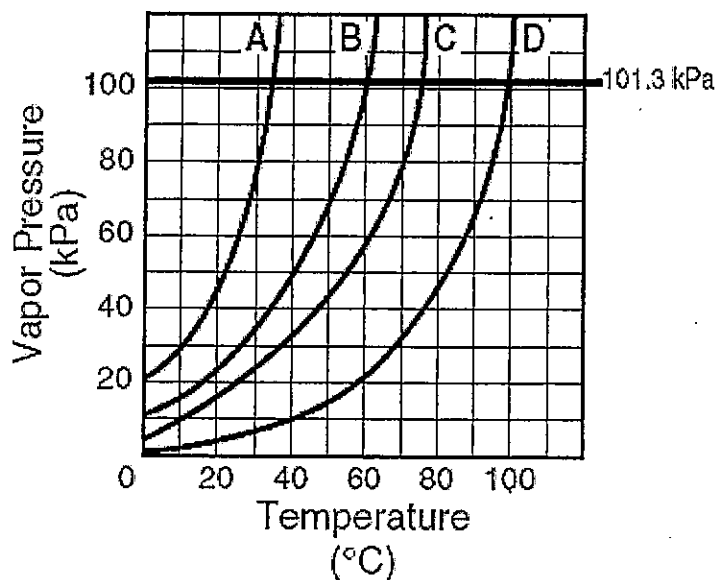
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