SURA'S

Sample Question Papers

CHEMISTRY

Time : 2½ hours

Written Exam Marks : 70 Marks

(Sample Question Papers only for Practice)

Kind Attention to the Students

- From this year onwards, blue print system has been abolished.
- Please note that questions will be framed from IN-TEXT portions ALSO.
- Approximately 20% of the questions will be asked from IN-TEXT portions.
- These questions will be based on Reasoning and Understanding of the lessons.
- Further, Creative and Higher Order Thinking Skills questions will also be asked. It requires the students to clearly understand the lessons. So the students have to think and answer such questions.
- It is instructed that henceforth if any questions are asked from 'out of syllabus', grace marks will not be given.
- Term Test, Revision Test and Model Exam will be conducted based on the above pattern only.
- Concentrating only on the book-back questions and/or previous year questions, henceforth, may not ensure to score 100% marks.
- Also note that the answers must be written either in blue ink or in black ink. Avoid using both the colour inks to answer the questions.
- For MCQs, the answers should be written in full. Simply writing (a) or (b) etc. will not get full marks. You have to write (a) or (b) etc., along with the answer given in the options.

11th STD. SURA'S SAMPLE QUESTION PAPER - 1

Time : 2.30 Hours **CHEMISTRY** **Marks : 70**

PART - I

Answer **all** the questions.

Choose the correct answer. **15 × 1 = 15**

1. Carbon forms two oxides, namely carbon monoxide and carbon dioxide. The equivalent mass of which element remains constant?
   (a) Carbon (b) oxygen
   (c) both carbon and oxygen (d) neither carbon nor oxygen

2. How many electrons in an atom with atomic number 105 can have (n + l) = 8 ?
   (a) 30 (b) 17 (c) 15 (d) unpredictable

3. The correct order of decreasing electronegativity values among the elements X, Y, Z and A with atomic numbers 4, 8 , 7 and 12 respectively
   (a) Y > Z > X > A (b) Z > A > Y > X (c) X > Y > Z > A (d) X > Y > A > Z

4. The hardness of water can be determined by volumetrically using the reagent
   (a) sodium thio sulphate (b) potassium permanganate
   (c) hydrogen peroxide (d) EDTA

5. Which is the correct sequence of solubility of carbonates of alkaline earth metals ?
   (a) $BaCO_3 > SrCO_3 > CaCO_3 > MgCO_3$ (b) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$
   (c) $CaCO_3 > BaCO_3 > SrCO_3 > MgCO_3$ (d) $BaCO_3 > CaCO_3 > SrCO_3 > MgCO_3$

6. 25g of each of the following gases are taken at 27°C and 600 mm Hg pressure. Which of these will have the least volume ?
   (a) HBr (b) HCl (c) HF (d) HI

7. The correct thermodynamic conditions for the spontaneous reaction at all temperature is
   (a) $\Delta H < 0$ and $\Delta S > 0$ (b) $\Delta H < 0$ and $\Delta S < 0$
   (c) $\Delta H > 0$ and $\Delta S = 0$ (d) $\Delta H > 0$ and $\Delta S > 0$

8. The mass of a gas that occupies a volume of 612.5 ml at room temperature and pressure (25° c and 1 atm pressure) is 1.1g. The molar mass of the gas is

(a) 66.25 g mol^{-1} (b) 44 g mol^{-1}

(c) 24.5 g mol^{-1} (d) 662.5 g mol^{-1}

9. According to the Bohr Theory, which of the following transitions in the hydrogen atom will give rise to the least energetic photon ?

(a) n = 6 to n = 1 (b) n = 5 to n = 4

(c) n = 5 to n = 3 (d) n = 6 to n = 5

10. **Assertion :** Helium has the highest value of ionisation energy among all the elements known

Reason : Helium has the highest value of electron affinity among all the elements known

(a) Both assertion and reason are true and reason is correct explanation for the assertion

(b) Both assertion and reason are true but the reason is not the correct explanation for the assertion

(c) Assertion is true and the reason is false

(d) Both assertion and the reason are false

11. Water gas is

(a) $H_2O_{(g)}$ (b) $CO + H_2O$ (c) $CO + H_2$ (d) $CO + N_2$

12. In case of alkali metal halides, the ionic character increases in the order

(a) MF < MCl < MBr < MI (b) MI < MBr < MCl < MF

(c) MI < MBr < MF < MCl (d) none of these

13. The heat of formation of CO and CO_2 are – 26.4 kcal and – 94 kcal, respectively. Heat of combustion of carbon monoxide will be

(a) + 26.4 kcal (b) – 67.6 kcal (c) – 120.6 kcal (d) + 52.8 kcal

14. A bottle of ammonia and a bottle of HCl connected through a long tube are opened simultaneously at both ends. The white ammonium chloride ring first formed will be

(a) At the center of the tube (b) Near the hydrogen chloride bottle

(c) Near the ammonia bottle (d) Throughout the length of the tube

15. sodium is stored in

(a) alcohol (b) water (c) kerosene (d) none of these

PART - II

Answer any **six** questions in which question **No.21** is compulsory. **6 × 2 = 12**

16. What do you understand by the term mole.
17. The stabilisation of a half filled d - orbital is more pronounced than that of the p-orbital why?
18. In what period and group will an element with Z = 118 will be present?
19. Predict which of the following hydrides is a gas on a solid (a) HCl (b) NaH. Give your reason.
20. An alkali metal (x) forms a hydrated sulphate, X_2SO_4. $10H_2O$. Is the metal more likely to be sodium (or) potassium.
21. Suppose there is a tiny sticky area on the wall of a container of gas. Molecules hitting this area stick there permanently. Is the pressure greater or less than on the ordinary area of walls?
22. Define Hess's law of constant heat summation.
23. Beryllium halides are Covalent whereas magnesium halides are ionic why?
24. What is lattice energy?

PART - III

Answer any **six** questions in which question **No.30** is compulsory. **6 × 3 = 18**

25. Mass of one atom of an element is 6.645×10^{-23}g. How many moles of element are there in 0.320 kg.
26. Show that the circumference of the Bohr orbit for the hydrogen atom is an integral multiple of the de Broglie wave length associated with the electron revolving arround the nucleus.
27. Why halogens act as oxidising agents?
28. What is water-gas shift reaction?
29. Which would you expect to have a higher melting point, magnesium oxide or magnesium fluoride? Explain your reasoning.
30. What are ideal gases? In what way real gases differ from ideal gases.
31. List the characteristics of internal energy.
32. How would you explain the fact that the second ionisation potential is always higher than first ionisation potential?
33. Distinguish between diffusion and effusion.

PART - IV

Answer **all** the questions. **(5 × 5 = 25)**

34. a) Calculate the empirical and molecular formula of a compound containing 76.6% carbon, 6.38 % hydrogen and rest oxygen its vapour density is 47.

(or)

b) How do you expect the metallic hydrides to be useful for hydrogen storage ?

35. a) Explain the important common features of Group 2 elements.

(or)

b) A tank contains a mixture of 52.5 g of oxygen and 65.1 g of CO_2 at 300 K the total pressure in the tanks is 9.21 atm. Calculate the partial pressure (in atm.) of each gas in the mixture.

36. a) A gas mixture of 3.67 lit of ethylene and methane on complete combustion at 25°C and at 1 atm pressure produce 6.11 lit of carbondioxide. Find out the amount of heat evolved in kJ, during this combustion. ($\Delta H_C(CH_4) = -890$ kJ mol^{-1} and ($\Delta H_C(C_2H_4) = -1423$ kJ mol^{-1}.

(or)

b) Why the first ionisation enthalpy of sodium is lower than that of magnesium while its second ionisation enthalpy is higher than that of magnesium?

37. a) How fast must a 54g tennis ball travel in order to have a de Broglie wavelength that is equal to that of a photon of green light 5400Å?

(or)

b) Explain whether a gas approaches on ideal behavior or deviates from ideal behaviour if

(a) it is compressed to a smaller volume at constant temperature.

(b) the temperature is raised at while keeping the volume constant

(c) more gas is introduced into the same volume and at the same temperature

38. a) The Li^{2+} ion is a hydrogen like ion that can be described by the Bohr model. Calculate the Bohr radius of the third orbit and calculate the energy of an electron in 4^{th} orbit.

(or)

b) Explain the following, give appropriate reasons.

(i) Ionisation potential of N is greater than that of O

(ii) First ionisation potential of C-atom is greater than that of B atom, where as the reverse is true is for second ionisation potential.

(iii) The electron affinity values of Be, Mg and noble gases are zero and those of N (0.02 eV) and P (0.80 eV) are very low

(iv) The formation of $F^-(g)$ from F(g) is exothermic while that of $O^{2-}(g)$ from O (g) is endothermic.

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ANSWERS

PART - I

1. (b) oxygen
2. (b) 17
3. (a) Y > Z > X > A
4. (d) EDTA
5. (b) $MgCO_3 > CaCO_3 > SrCO_3 > BaCO_3$
6. (d) HI
7. (a) $\Delta H < 0$ and $\Delta S > 0$
8. (b) 44 g mol^{-1}
9. (d) n = 6 to n = 5
10. (c) Assertion is true and the reason is false
11. (c) $CO + H_2$
12. (b) MI < MBr < MCl < MF
13. (b) – 67.6 kcal
14. (b) Near the hydrogen chloride bottle
15. (c) kerosene

PART - II

16. One mole is the amount of substance of a system, which contains as many elementary particles as there are atoms in 12 g of carbon-12 isotope. The elementary particles can be molecules, atoms, ions, electrons or any other specified particles.
17. (i) The half filled d-orbital is much stabilised than the p-orbital.
    (ii) This is due to its high exchange energy and symmetry than that of p-orbital.

18. $Z = 118$; $[_{86}Rn]\ 5f^{14}\ 6d^{10}\ 7s^2\ 7p^6$

In the periodic table the element with Z = 118 is located in p-block.

Period no. = 7 (as n = 7 for valence shell)

Group no. = 18 (group no = 10+ ns electrons + np electrons) (n - outer most shell)

19. (a) Gas - due to the absence of inter molecular hydrogen bonding.

(b) Solid

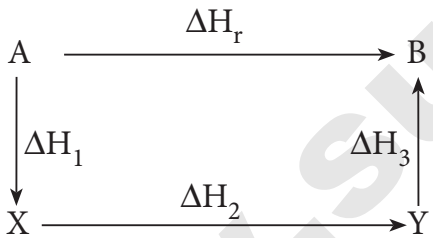
Reason : NaH is a ionic hydride formed by transfer of electrons from metal to hydrogen. They have high lattice enthalpy and high density since hydride ions occupy holes in the lattice of metal without distorting the metal lattice.

20. The metal more likely to form a hydrated sulphate is sodium of formula $Na_2SO_4.10H_2O$.

Smaller the size of the ion greater is the degree of hydration. Hydration energy is in the order of, $Li^+ > Na^+ > K^+ > Rb^+ > Cs^+$ so sodium is hydrated more easily than potassium.

21. If the gas molecules stick to the walls of the container, then the number of molecules striking the walls of the container decreases. An decrease in the number of gas molecules in the same volume container decreases pressure.

22. The enthalpy change of a reaction either at constant volume or constant pressure is the same whether it takes place in a single or multiple steps provided the initial and final states are same.



$$\Delta H_r = \Delta H_1 + \Delta H_2 + \Delta H_3$$

23. Due to small size of Be^{2+}, the charge density is very high. According to Fajan's Rule, cation with small size has high polarising power and prefers to form covalent bonds. So beryllium halides are Covalent in nature.

24. Lattice energy is defined as "The amount of energy required to completely remove the constituent ions from its crystal lattice to an infinite distance." It is also referred as lattice enthalpy.

PART - III

25. **Given :**

mass of one atom = 6.645×10^{-23} g

$\therefore$ mass of 1 mole of atom

$= 6.645 \times 10^{-23}\ g \times 6.022 \times 10^{23}$

$= 40$ g

$\therefore$ number of moles of element in 0.320 kg

$$= \frac{1\ mole}{40g} \times 0.320kg$$

$$= \frac{1\ mol \times 320g}{40g}$$

$= 8$ mol.

26. **Quantisation of angular momentum and de Broglie concept :** According to the de Broglie concept, the electron that revolves around the nucleus exhibits both particle and wave character. In order for the electron wave to exist in phase, the circumference of the orbit should be an integral multiple of the wavelength of the electron wave. Otherwise, the electron wave is out of phase.

Circumference of the orbit = $n\lambda$

$2\pi r = n\lambda$

$2\pi r = nh/mv$

Rearranging, $mvr = nh/2\pi$

Angular momentum = $nh/2\pi$

The above equation was already predicted by Bohr.

Hence, De Broglie and Bohr's concepts are in agreement with each other.

27. **(i)** Due to low bond dissociation enthalpy, high electronegativity and large negative electron gain enthalpy, halogen have a strong tendency to accept electrons and thus get reduced.

$$X_2 + 2e^- \longrightarrow 2X^-$$

(ii) The ready acceptance of an electron is due to the strong oxidising nature of halogens.

(iii) F_2 is the strongest oxidising halogen and it oxidises other halide ions in solution or even in the solid phase. In general, a halogen oxidises halide ions of higher atomic number.

(iv) Hence, the oxidising ability of halogens decreases from fluorine to iodine as :

$$F_2 > Cl_2 > Br_2 > I_2$$

28. The carbon monoxide of the water gas can be converted to carbon dioxide by mixing the gas mixture with more steam at 400°C and passed over a shift converter containing iron/copper catalyst. This reaction is called as water-gas shift reaction.

$$CO + H_2O \longrightarrow CO_2 + H_2$$

The CO_2 formed in the above process is absorbed in a solution of potassium carbonate.

$$CO_2 + K_2CO_3 + H_2O \longrightarrow 2KHCO_3$$

29. MgO has higher melting point than MgF since charge of oxygen is O^{2-} and fluorine is F^-. As the charge in the ionic lattice in magnesium oxide is two times larger, the ionic bonding is stronger so more energy is required to overcome the electrostatic attraction and break down the ionic lattice. So magnesium oxide would have higher melting point than magnesium fluoride.

30. An ideal gas is defined as one in which all collisions between atoms or molecules are perfectly eleastic and in which there are no intermolecular attractive forces. An ideal gas is a gas that obeys the ideal gas law, PV = nRT, where n is the number of moles of the gas , R is the ideal gas constant,pressure P, volume V, and temperature T

Difference between ideal and real gas :

	Ideal Gas	Real gas
(i)	Ideal gases obey all gas laws under all conditions of temperature and pressure	Real obey gas law only at low pressures and high temperature.
(ii)	The volume occupied by the molecules is negligible as compared to the total volume occupied by the gas.	The volume occupied by the molecules is not negligible as compared to the total volume of the gas.
(iii)	The force of attraction among the molecules are negligible	The force of attraction are not negligible at all temperatures and pressures.

31. **Characteristics of internal energy (U) :**

- The internal energy of a system is an extensive property.
- The internal energy of a system is a state function.
- The change in internal energy of a system is expressed as $\Delta U = U_f - U_i$
- In a cyclic process, there is no internal energy change. $\Delta U_{(cyclic)} = 0$
- If the internal energy of the system in the final state (U_f) is less than the internal energy of the system in its initial state (U_i), then ΔU would be negative.

$$\Delta U = U_f - U_i = -ve\ (U_f < U_i)$$

- If the internal energy of the system in the final state (U_f) is greater than the internal energy of the system in its initial state (U_i), then ΔU would be positive.

$$\Delta U = U_f - U_i = +ve\ (U_f > U_i)$$

32. The total number of electrons are less in the cation than the neutral atom while the nuclear charge remains the same. Therefore the effective nuclear charge of the cation is higher than the corresponding neutral atom. Thus the successive ionisation energies, always increase in the following order

$$IE_1 < IE_2 < IE_3 < .....$$

33. **Distinguish between diffusion and effusion :** Diffusion is the process by which molecules move and travel from one place to another without requiring bulk motion. Diffusion results in molecules moving or mixing by only using kinetic energy. Effusion is the process by which molecules travel through a pinhole from a place of high concentration to low concentration. The process describes the ability of gas to travel through a small hole without collisions between molecules.

PART - IV

34. a)

Element	Percentage	Atomic mass	Relative number of atoms	Simple ratio	Whole no
C	76.6	12	$\frac{76.6}{12} = 6.38$	$\frac{6.38}{1.06} = 6$	6
H	6.38	1	$\frac{6.38}{1} = 6.38$	$\frac{6.38}{1.06} = 6$	6
O	17.02	16	$\frac{17.02}{16} = 1.06$	$\frac{1.06}{1.06} = 1$	1

Empirical formula = C_6H_6O

$$n = \frac{\text{Molar mass}}{\text{Calculated empirical formula mass}}$$

$$= \frac{2 \times \text{vapour density}}{94} = \frac{2 \times 47}{94} = 1$$, since Molar mass = 2 × Vapour density

molecular formula n × n empirical formula

∴ molecular formula $(C_6H_6O) \times 1 = C_6H_6O$.

(or)

b) In some of the transition metal hydrides, hydrogen is absorbed as H-atoms. Due to the inclusion of H-atoms, the metal lattice expands and thus becomes less stable. Therefore, when such metallic hydride is heated, it decomposes to release hydrogen gas and very finely divided metal. The hydrogen evolved in this manner can be used as a fuel. Thus, transition metals or their alloys can act as sponge and can be used to store and transport hydrogen to be used as a fuel.

35. a) Group 2 elements are known as alkaline earth metals. It includes beryllium, magnesium, calcium, strontium, barium, and radium. They exist in +2 oxidation states.

The general outer electronic configuration of alkaline earth metal is ns^2.

Physical Characteristics :

- They are silvery, white, and hard metals. They are softer but harder than alkali metals.
- Their melting and boiling points are higher compared to alkali metals.
- They are strongly electropositive in nature. Alkaline earth metals give different color with flame test.

Chemical Properties :

- All alkaline earth metals forms monoxide except beryllium.
- They have high electrical and thermal conductivities as they have metallic bonding.
- The oxides of alkaline earth metals are basic but less basic than alkali metals.
- Hydroxides of alkaline earth metals are basic in nature except beryllium hydroxide.
- Group 2 metals forms solid carbonates.
- Alkaline earth metals also form sulphates such as $BeSO_4$, and $MgSO_4$.
- Group 2 elements form hydrated, crystallized nitrates.
- Alkaline earth metals forms halides after reacting with halogens.

(or)

b) $m_{O_2} = 52.5\ g\ P_{O_2} = ?$

$m_{CO_2} = 65.1\ g\ P_{CO_2} = ?$

$T = 300\ K\ P = 9.21\ atm$

$P_{O_2} = X_{O_2} \times$ Total Pressure

$$X_{O_2} = \frac{n_{O_2}}{n_{O_2} + n_{CO_2}}$$

$$n_{O_2} = \frac{\text{Mass of } O_2}{\text{Molar mass of } O_2}$$

$$= \frac{52.5g}{32g\ mol^{-1}} = 1.64\ mol$$

$$n_{CO_2} = \frac{\text{Mass of } CO_2}{\text{Molar mass of } CO_2}$$

$$= \frac{65.1g}{44g\ mol^{-1}} = 1.48\ mol$$

$$X_{O_2} = \frac{P_1V_1}{P_2} = \frac{1.64}{3.12} = 0.53$$

$$X_{CO_2} = \frac{n_{CO_2}}{n_{O_2} + n_{CO_2}} = \frac{1.48}{3.12} = 0.47$$

$$P_{O_2} = X_{O_2} \times \text{Total pressure}$$

$$= 0.53 \times 9.21\ atm = 4.88\ atm$$

$$P_{CO_2} = X_{CO_2} \times \text{Total pressure}$$

$$= 0.47 \times 9.21\ atm = 4.33\ atm.$$

36. a) $\Delta H_C\ (CH_4) = -890\ kJ\ mol^{-1}$

$\Delta H_C\ (C_2H_4) = -1423\ kJ\ mol^{-1}$

Let the mixture contain x lit of CH_4 and (3.67 − x) lit of ethylene.

$CH_4 + 2O_2 \longrightarrow CO_2 + 2H_2O$

x lit x lit

$C_2H_4 + 3O_2 \longrightarrow 2CO_2 + 2H_2O$

(3.67−x)lit 2 (3.67 − x) lit

Volume of Carbondioxide formed

$= x + 2\ (3.67 - x) = 6.11$ lit

$x + 7.34 - 2x = 6.11$

$7.34 - x = 6.11$

$x = 1.23$ lit

Given mixture contains 1.23 lit of methane and 2.44 lit of ethylene, hence

$$\Delta H_C = \left[\frac{\Delta H_C\,(CH_4)}{22.4\ lit} \times (x)\ lit\right] + \left[\frac{\Delta H_C\,(C_2H_4)}{22.4\ lit} \times (3.67 - x)\ lit\right]$$

$$\Delta H_C = \left[\frac{-890kJ\ mol^{-1}}{22.4\ lit} \times 1.23lit\right] + \left[\frac{-1423}{22.4\ lit} \times (3.67 - 1.23)lit\right]$$

ΔH_C = [–48.87 kJ mol^{-1}] + [–155kJ mol^{-1}]

ΔH_C = –203.87 kJ mol^{-1}.

(or)

b) The electronic configuration of Sodium (Z = 11) $1s^2\ 2s^2\ 2p^6\ 3s^1$.

Magnesium (Z = 12) $1s^2\ 2s^2\ 2p^6\ 3s^2$.

Magnesium atom has a smaller radius and higher nuclear charge than a sodium atom, thus more energy will be required to remove the electron from the same orbital (3s), making the first ionisation energy of magnesium higher than that of sodium.

However, the second ionization enthalpy of sodium is higher than that of magnesium. This is because after losing 1 electron, sodium attains the stable noble gas configuration of neon ($1s^2\ 2s^2\ 2p^6$). On the other hand, magnesium, after losing 1 electron still has one electron in the 3s-orbital($1s^2\ 2s^2\ 2p^6\ 3s^1$). In order to attain the stable noble gas configuration, Thus, the energy required to remove the second electron in case of sodium is much higher than that required in case of magnesium. Hence, the second ionization enthalpy of sodium is higher than that of magnesium.

37. a) **Given :** de Broglie wavelength of the tennis ball equal to 5400 Å.

m = 54 g

v = ?

$\lambda = \frac{h}{mV}$

$V = \frac{h}{m\lambda}$

$V = \frac{6.626 \times 10^{-34}\ JS}{54 \times 10^{-3}\ Kg \times 5400 \times 10^{-10}\ m}$

V = 2.27×10^{-26} ms^{-1}.

(or)

b) **(a) It is compressed to a smaller volume at constant temperature :** In the isothermal compression of a gas work is done on the system to decrease the volume and increase the pressure. Increase in pressure increases the intermolecular force of attraction between the gas molecules and so deviate from ideal behaviour.

(b) The temperature is raised at while keeping the volume constant : In a isochoric process the quantity of the gas remains constant but rise in temperature increases the pressure so deviates from ideal gas behaviour.

(c) More gas is introduced into the same volume and at the same temperature : If more gas is introduced in the same volume and temperature is constant, more will be the pressure. Increase in pressure, increases the intermolecular force of attraction between the molecule, which makes the gases to deviate from Ideal behaviour.

38. a) $r_n = \frac{(0.529)n^2}{z}$ Å $\quad E_n = \frac{-13.6(z^2)}{n^2}$ ev atom^{-1}

for Li^{2+} z = 3

Bohr raduis for the third orbit (r_3)

$= \frac{(0.529)(3)^2}{3}$

$= 0.529 \times 3$

$= 1.587$ Å

Energy of an electron in the fourth orbit

$(E_4) = \frac{-13.6(3)^2}{(4)^2}$

$=$ **– 7.65 eV atom^{-1}.**

(or)

b) **(i)** Electron configuration of nitrogen

(Z = 7) $1s^2\ 2s^2\ 2p^3$.

Electron configuration of oxygen

(Z = 8) $1s^2\ 2s^2\ 2p^4$.

Nitrogen has a half filled electronic configuration which is much more stable than an incomplete p-orbital of oxygen which would need to give up one of it's electrons to attain the stability of nitrogen. Hence nitrogen would require more ionization energy to remove an electron from it's outer shell than oxygen.

(ii) Electron configuration of carbon

(Z = 6) $1s^2\ 2s^2\ 2p^2$.

Electron configuration of Boron

(Z = 5) $1s^2\ 2s^2\ 2p^1$.

The size of a carbon atom is smaller than boron. So the valence electron of carbon has greater nuclear charge than that of boron .Hence the first I.E of carbon is greater than that of boron.

However, the second ionization enthalpy of boron is higher than that of carbon. This is because after losing 1 electron, Boron has a fully filled orbital ($2s^2$) than carbon($2p^1$). Fully filled orbitals have more stability than partially filled orbitals so greater amount of energy will be needed to remove an electron from boron. So in this case, the second I.E of boron is higher than that of carbon.

(iii) The electron affinities of Be, Mg and noble gases are almost zero because both Be (Z = 4; $1s^2\ 2s^2$) and Mg (Z = 12; $1s^2\ 2s^2\ 2p^6\ 3s^2$) are having s orbital fully filled in their valence shell. Fully filled orbitals are most stable due to symmetry. Therefore, these elements would be having least tendency to accept electron. Hence, Be and Mg would be having zero electron affinity. Whereas

N (Z = 7; $1s^2\ 2s^2\ 2px^1\ 2py^1\ 2pz^1$) and P (Z = 15) $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^3$ is having half filled 2p-subshell. Half filled sub shells are most stable due to symmetry (Hund's rule). Thus, nitrogen and phosphorous are having least tendency to accept electron. Hence, have low electron affinity.

(iv) Fluorine is highly electro negative in nature therefore as it gains the electron its octet become stable and releases the energy so exothermic. while in oxygen the addition of first electron is exothermic in nature but addition of second electron experiences high repulsive force. So needs extra external energy to enter outer shell, hence endothermic in nature.

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