# DPP - Daily Practice Problems

## Chapter-wise Sheets

Classificationof Elements and Periodicity in Properties

**Max. Marks : 180** **Marking Scheme :** + 4 for correct & (–1) for incorrect **Time : 60 min.**

**INSTRUCTIONS** : This Daily Practice Problem Sheet contains 45 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.

**1.** Which of the following is not an actinoid ?
(a) Curium ($Z=96$) (b) Californium ($Z=98$)
(c) Uranium ($Z=92$) (d) Terbium ($Z=65$)

**2.** Which of the following species has lowest ionization potential?
(a) O (b) $O_2$ (c) $O_2^+$ (d) $O_2^-$

**3.** On going down a main sub-group in the periodic table (example Li to Cs in IA or Be to Ra in IIA), the expected trend of changes in atomic radius is a
(a) continuous increase
(b) continuous decrease
(c) periodic one, an increase followed by a decrease
(d) decrease followed by increase

**4.** Match the columns

| | **Column-I (Compounds)** | | **Column-II (Co-ordination number, oxidation number)** |
|---|---|---|---|
| A. | $[BF_4]^-$ | I. | 7,+7 |
| B. | $[AlF_6]^{3-}$ | II. | 4,+4 |
| C. | $OF_2$ | III. | 6,+3 |
| D. | $SiF_4$ | IV. | 2,+2 |
| E. | $IF_7$ | V. | 4,+3 |

(a) A – IV; B – II; C – V; D – III; E – I
(b) A – V; B – III; C – IV; D – II; E – I
(c) A – II; B – III; C – V; D – IV; E – I
(d) A – III; B – II; C – IV; D – I; E – V

**5.** The decreasing order of the ionization potential of the following elements is
(a) Ne > Cl > P > S > Al > Mg
(b) Ne > Cl > P > S > Mg > Al
(c) Ne > Cl > S > P > Mg > Ne > Cl > S > P > Al > Mg

**6.** The radii of F, $F^-$, O and $O^{2-}$ are in the order
(a) $O^{2-} > F^- > F > O$ (b) $F^- > O^{2-} > F > O$
(c) $O^{2-} > O > F^- > F$ (d) $O^{2-} > F^- > O > F$

**7.** Which group of the periodic table contains coinage metal ?
(a) IIA (b) IB
(c) IA (d) None of these

| **RESPONSE GRID** | 1. ⓐⓑⓒⓓ | 2. ⓐⓑⓒⓓ | 3. ⓐⓑⓒⓓ | 4. ⓐⓑⓒⓓ | 5. ⓐⓑⓒⓓ |
|---|---|---|---|---|---|
| | 6. ⓐⓑⓒⓓ | 7. ⓐⓑⓒⓓ | | | |

**8.** Which of the following statements are correct?
(i) The second period ($n = 2$) starts with lithium and third electron enters the $2s$ orbital. The next element, beryllium has four electrons and has the electronic configuration $1s^2 2s^2$. From the next element boron, the $2p$ orbitals are filled with electrons when the L shell is completed at neon ($2s^2 2p^6$). Thus there are 8 elements in the second period.
(ii) Successive filling of $3s$ and $3p$ orbitals gives rise to the third period of 8 elements from sodium to argon.
(iii) The fourth period ($n = 4$) starts at potassium and the added electron fill up the first $4s$ and $4p$ orbitals than $3d$ orbital is filled.
(iv) Fifth period begins with rubidium with the filling of $5s$ orbital and ends at xenon with the filling up of the $5p$ orbital.
(a) (i) and (ii) (b) (i), (ii) and (iii)
(c) (iii) and (iv) (d) (i), (ii) and (iv)

**9.** Which ionisation potential (IP) in the following equations involves the greatest amount of energy ?
(a) $Na \rightarrow Na^+ + e^-$ (b) $K^+ \rightarrow K^{2+} + e^-$
(c) $C^{2+} \rightarrow C^{3+} + e^-$ (d) $Ca^+ \rightarrow Ca^{2+} + e^-$

**10.** Which of the following arrangements represents the increasing order (smallest to largest) of ionic radii of the given species $O_2^-$, $S_2^-$, $N^{3-}$, $P^{3-}$?
(a) $O^2 < N^3 < S^2 < P^3$ (b) $O^2 < P^3 < N^3 < S^2$
(c) $N^3 < O^{2-} < P^{3-} < S^{2-}$ (d) $N^{3-} < S^{2-} < O^{2-} < P^{3-}$

**11.** Which of the following series correctly represents relations between the elements from X to Y?
$X \rightarrow Y$
(a) ${}_3Li \rightarrow {}_{19}K$ Ionization enthalpy increases
(b) ${}_9F \rightarrow {}_{35}Br$ Electron gain enthalpy (negative sign) increases
(c) ${}_6C \rightarrow {}_{32}Ge$ Atomic radii increases
(d) ${}_{18}Ar \rightarrow {}_{54}Xe$ Noble character increases

**12.** The formation of the oxide ion $O^{2-}(g)$, from oxygen atom requires first an exothermic and then an endothermic step as shown below :
$O(g) + e^- \rightarrow O^-(g)$; $\Delta_f H^\ominus = -141\ kJ\ mol^{-1}$
$O^-(g) + e^- \rightarrow O^{2-}(g)$; $\Delta_f H^\ominus = +780\ kJ\ mol^{-1}$
Thus process of formation of $O^{2-}$ in gas phase is unfavourable even though $O^{2-}$ is isoelectronic with neon. It is due to the fact that
(a) Electron repulsion outweighs the stability gained by achieving noble gas configuration
(b) $O^-$ ion has comparatively smaller size than oxygen atom
(c) Oxygen is more electronegative
(d) Addition of electron in oxygen results in larger size of the ion.

**13.** In any period the valency of an element with respect to oxygen
(a) Increases one by one from IA to VIIA
(b) Decreases one by one form IA to VIIA
(c) Increases one by one from IA to IVA and then decreases from VA to VIIA one by one
(d) Decreases one by one from IA to IVA and then increases from VA to VIIA one by one

**14.** An element having electronic configuration ls
$^2 2s^2 2p^6 3s^2 3p^6 4s^1$ forms
(a) Acidic oxide (b) Basic oxide
(c) Amphoteric oxide (d) Neutral oxide

**15.** Which of the following order is wrong?
(a) $NH_3 < PH_3 < AsH_3$ —Acidic
(b) $Li < Be < B < C$ — $IE_1$
(c) $Al_2O_3 < MgO < Na_2O < K_2O$ — Basic
(d) $Li^+ < Na^+ < K^+ < Cs^+$ — Ionic radius

**16.** The first ionisation potential of aluminium is smaller than that of magnesium because
(a) Atomic size of Al >Atomic size of Mg.
(b) Atomic size of Al <Atomic size of Mg.
(c) Al has one electron in p - orbital

**17.** The first ($\Delta_i H_1$) and second ($\Delta_i H_2$) ionization enthalpies (in kJ $mol^{-1}$) and the electron gain enthalpy ($\Delta_{eg} H$) (in kJ $mol^{-1}$) of the elements I, II, III, IV and V are given below

| Element | $\Delta_i H_1$ | $\Delta_i H_2$ | $\Delta_{eg} H$ |
|---|---|---|---|
| I | 520 | 7300 | −60 |
| II | 419 | 3051 | −48 |
| III | 1681 | 3374 | −328 |
| IV | 1008 | 1846 | −295 |
| V | 2372 | 5251 | +48 |

The most reactive metal and the least reactive non-metal of these are respectively
(a) I and V (b) III and II (c) II and V (d) IV and V

**18.** Consider the following statements:
(i) The discovery of inert gases later on did not disturb Mendeleev's arrangement.
(ii) In the present periodic table, periodicity in the properties of elements is related to the periodicity in their electronic configurations.
Which of these statement(s) is/are correct ?
(a) (i) only (b) (ii) only
(c) Both (i) and (ii) (d) Neither (i) nor (ii)

| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| | **8.** ⓐⓑⓒⓓ | **9.** ⓐⓑⓒⓓ | **10.** ⓐⓑⓒⓓ | **11.** ⓐⓑⓒⓓ | **12.** ⓐⓑⓒⓓ |
| | **13.** ⓐⓑⓒⓓ | **14.** ⓐⓑⓒⓓ | **15.** ⓐⓑⓒⓓ | **16.** ⓐⓑⓒⓓ | **17.** ⓐⓑⓒⓓ |
| | **17.** ⓐⓑⓒⓓ | **18.** ⓐⓑⓒⓓ | | | |

**19.** Consider the following ionization enthalpies of two elements 'A' and 'B'.

| Element | Ionization enthalpy (kJ/mol) | | |
|---|---|---|---|
| | 1st | 2nd | 3rd |
| A | 899 | 1757 | 14847 |
| B | 737 | 1450 | 7731 |

Which of the following statements is correct ?

(a) Both 'A' and 'B' belong to group–1 where 'B' comes below 'A'.

(b) Both 'A' and 'B' belong to group–1 where 'A' comes below 'B'.

(c) Both 'A' and 'B' belong to group–2 where 'B' comes below 'A'.

(d) Both 'A' and 'B' belong to group–2 where 'A' comes below 'B'.

**20.** Sodium sulphate is soluble in water whereas barium sulphate is sparingly soluble because :

(a) the hydration energy of sodium sulphate is less than its lattice energy

(b) the lattice energy of barium sulphate is more than its hydration energy

(c) the lattice energy has no role to play in solubility

(d) the hydration energy of sodium sulphate is less than its lattice energy.

**21.** Which of the following is the reason for the different chemical behaviour of the first member of a group of elements in the *s*- and *p*-blocks compared to that of the subsequent members in the same group?

(i) Small size

(ii) Large charge / radius ratio

(a) (i) and (iii) (b) (i), (ii) and (iii)

(c) (i) and (ii) (d) (ii) and (iii)

**22.** The element with outer electronic configuration $3d^6 4s^2$ is a

(a) metalloid (b) non-metal

(c) transition metal (d) noble gas

**23.** Which of the following statements is wrong ?

(a) van der Waal's radius of iodine is more than its covalent radius

(b) All isoelectronic ions belong to same period of the periodic table

(c) $I.E._1$ of N is higher than that of O while $I.E._2$ of O is higher than that of N

(d) The electron gain enthalpy of N is almost zero while that of P is 74.3 kJ $mol^{-1}$

**24.** Which of the following sequence correctly represents the decreasing acidic nature of oxides ?

(a) $Li_2O > BeO > B_2O_3 > CO_2 > N_2O_3$

(b) $N_2O_3 > CO_2 > B_2O_3 > BeO > Li_2O$

(c) $CO_2 > N_2O_3 > B_2O_3 > BeO > Li_2O$

(d) $B_2O_3 > CO_2 > N_2O_3 > Li_2O > BeO$

**25.** An atom has electronic configuration $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 3d^3\ 4s^2$, you will place it in which group?

(a) Fifth (b) Fifteenth

(c) Second (d) Third

**26.** In which of the following arrangements, the sequence is not strictly according to the property written against it?

(a) $CO_2 < SiO_2 < SnO_2 < PbO_2$: increasing oxidising power

(b) $NH_3 < PH_3 < AsH_3 < SbH_3$: increasing basic strength

(c) HF < HCl < HBr < HI : increasing acid strength

(d) B < C < O < N: increasing first ionisation enthalpy.

**27.** Which one of the following statements is incorrect ?

(a) Greater the nuclear charge, greater is the electron affinity

(b) Nitrogen has zero electron affinity

(c) Electron affinity decreases from fluorine to iodine in 17th group

(d) Chlorine has highest electron affinity

**28.** An element X occurs in short period having configuration $ns^2\ np^1$. The formula and nature of its oxide is

(a) $XO_3$, basic (b) $XO_3$ acidic

(c) $X_2O_3$, amphoteric (d) $X_2O_3$ basic

**29.** Ionic radii of

(a) $Ti^{4+} < Mn^{2+}$ (b) $^{35}Cl^- < {}^{37}Cl^-$

(c) $K^+ > Cl^{-1}$ (d) $P^{3+} > P^{5+}$

**30.** The ionic radii (in Å) of $N^{3-}$, $O^{2-}$ and $F^-$ are respectively :

(a) 1.71, 1.40 and 1.36 (b) 1.71, 1.36 and 1.40

(c) 1.36, 1.40 and 1.71 (d) 1.36, 1.71 and 1.40

**31.** Amongst $H_2O$, $H_2S$, $H_2Se$ and $H_2Te$, the one with the highest boiling point is

(a) $H_2O$ because of hydrogen bonding

(b) $H_2Te$ because of higher molecular weight

(c) $H_2S$ because of hydrogen bonding

(d) $H_2Se$ because of lower molecular weight

**32.** Match the Column-I and Column-II and select the correct answer by given codes.

| | **Column-I (Elements)** | | **Column-II (Properties)** |
|---|---|---|---|
| A. | $Li^+ < Al^{3+} < Mg^{2+} < K^+$ | I. | DEA (Electron affinity) |
| B. | $Li^+ > Al^{3+} > Mg^{2+} > K^+$ | II. | Ionic radii |
| C. | Cl > F > Br > I | III. | EN (Electronegativity) |
| D. | F > Cl > Br > I | IV. | Effective nuclear charge |

(a) A – II; B – IV; C – III; D – I

(b) A – II; B – IV; C – I; D – III

(c) A – IV; B – II; C – III; D – I

| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| | **19.** ⓐⓑⓒⓓ | **20.** ⓐⓑⓒⓓ | **21.** ⓐⓑⓒⓓ | **22.** ⓐⓑⓒⓓ | **23.** ⓐⓑⓒⓓ |
| | **24.** ⓐⓑⓒⓓ | **25.** ⓐⓑⓒⓓ | **26.** ⓐⓑⓒⓓ | **27.** ⓐⓑⓒⓓ | **28.** ⓐⓑⓒⓓ |
| | **29.** ⓐⓑⓒⓓ | **30.** ⓐⓑⓒⓓ | **31.** ⓐⓑⓒⓓ | **32.** ⓐⓑⓒⓓ | |

**33.** Which of the following statement(s) is/are correct ?
(i) Aluminium react with HCl to form $Al^{3+}$ and $H_2$ is liberated
(ii) Aluminium dissolve in NaOH to form $NaAl(OH)_4$ and $H_2$
(a) (i) and(ii) (b) Only(ii)
(c) Only(i) (d) Neither (i) nor(ii)

**34.** Which has most stable+2 oxidation state :
(a) Sn (b) Pb (c) Fe (d) Ag

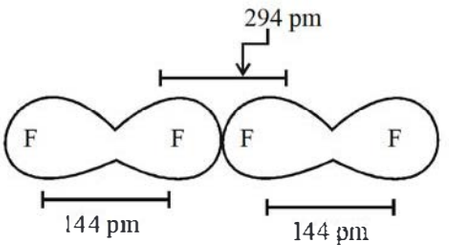
**35.** Match Column-I (IUPAC nomenclature of element) with Column-II (IUPAC official name).

| Column-I | | Column-II | |
|---|---|---|---|
| A. | Unnilhexium | I. | Lawrencium |
| B. | Unniltriun | II. | Dubnium |
| C. | Unnilunium | III. | Seaborgium |
| D. | Unnilpentiun | IV. | Mendelevium |

(a) A – IV; B – I; C – III; D – II
(b) A – III; B – I; C – IV; D – II
(c) A – III; B – IV; C – I; D – II
(d) A – II; B – III; C – I; D – IV

**36.** In the Mendeleev periodic table, which of the following element instead of having lower atomic weight was placed after the element of higher atomic weight thereby ignoring the order of increasing atomic weights.
(a) Iodine (b) Antimony
(c) Bromine (d) Molybdenum

**37.** The van der Waal and covalent radii of fluorine atom respectively from the following figure are.




(a) 219pm, 72pm (b) 75pm, 72pm
(c) 147pm, 72pm (d) 147pm, 144pm

**38.** Cl, Br, I, if this is Dobereiner's triad and the atomic masses of Cl and I are 35.5 and 127 respectively the atomic mass of Br is
(a) 162.5 (b) 91.5 (c) 81.25 (d) 45.625

**39.** The first ionisation potential of Na is 5.1 eV. The value of electron gain enthalpy of $Na^+$ will be:
(a) –2.55eV (b) –5.1eV
(c) –10.2eV (d) +2.55eV

**40.** As we move across the second period from C to F ionisation enthalpy increases but the trend from C to F for ionisation enthalpyis C < O < N < F why it is not C < N < O < F. This is because
(a) atomic radii of O > atomic radii of N
(b) electronic configuration of N is more stable than electronic configuration of O
(c) atomic radii of N > atomic radii of O
(d) None of these

**41.** The electron affinity of chlorine is 3.7 eV. 1 gram of chlorine is completely converted to $Cl^-$ ion in a gaseous state. (1eV = 23.06 kcalmol$^{-1}$).
Energy released in the process is
(a) 4.8 kcal (b) 7.2 kcal (c) 8.2kcal (d) 2.4kcal

**42.** Gradual addition of electronic shells in the noble gases causes a decrease in their
(a) ionization energy (b) atomic radius
(c) boiling point (d) density

**43.** The formation of the oxide ion $O^{2-}_{(g)}$ requires first an exothermic and then an endothermic step as shown below $O_{(g)} + e^- = O^-_{(g)}$ $\Delta H^o = -142$ kJmol$^{-1}$

This is because
(a) $O^-$ ion will tend to resist the addition of another electron
(b) Oxygen has high electron affinity
(c) Oxygen is more elecronegative
(d) $O^-$ ion has comparatively larger size than oxygen atom

**44.** Which of the following is correct about Eka-Aluminium and Eka-Silicon ?
(a) Oxides of Eka-Aluminium is $Al_2O_3$ and Eka-Silicon is $Si_2O_3$
(b) Oxides of Eka-Aluminium is $Ga_2O_3$ and Eka-Silicon is $GeO_2$
(c) Melting point of Eka-Aluminium is lower than the melting point of Eka-Silicon
(d) Both (a) and (c)

**45.** Covalent radii of atoms varies in range of 72 pm to 133 pm from F to I while that of noble gases He to Xe varies from 120pm to 220pm. This is because in case of noble gases
(a) covalent radius is very large
(b) van der Waal radius is considered
(c) metallic radii is considered
(d) None of these

| RESPONSE GRID | | | | | |
|---|---|---|---|---|---|
| | **33.** ⓐⓑⓒⓓ | **34.** ⓐⓑⓒⓓ | **35.** ⓐⓑⓒⓓ | **36.** ⓐⓑⓒⓓ | **37.** ⓐⓑⓒⓓ |
| | **38.** ⓐⓑⓒⓓ | **39.** ⓐⓑⓒⓓ | **40.** ⓐⓑⓒⓓ | **41.** ⓐⓑⓒⓓ | **42.** ⓐⓑⓒⓓ |
| | **43.** ⓐⓑⓒⓓ | **44.** ⓐⓑⓒⓓ | **45.** ⓐⓑⓒⓓ | | |