DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 42

SYLLABUS : *p*-Block elements (Gp-17 & 18) : Halogen Family & Inert Gases

Max. Marks : 120 **Time : 60 min.**

GENERAL INSTRUCTIONS

- The Daily Practice Problem Sheet contains 30 MCQ's. For each question only one option is correct. Darken the correct circle/ bubble in the Response Grid provided on each page.
- You have to evaluate your Response Grids yourself with the help of solution booklet.
- Each correct answer will get you 4 marks and 1 mark shall be deduced for each incorrect answer. No mark will be given/ deducted if no bubble is filled. Keep a timer in front of you and stop immediately at the end of 60 min.
- The sheet follows a particular syllabus. Do not attempt the sheet before you have completed your preparation for that syllabus. Refer syllabus sheet in the starting of the book for the syllabus of all the DPP sheets.
- After completing the sheet check your answers with the solution booklet and complete the Result Grid. Finally spend time to analyse your performance and revise the areas which emerge out as weak in your evaluation.

DIRECTIONS (Q.1-Q.21) : There are 21 multiple choice questions. Each question has 4 choices (a), (b), (c) and (d), out of which ONLY ONE choice is correct.

Q.1 Bromine is liberated when an aqueous solution of potassium bromide is treated with

(a) Cl_2

(b) I_2

(c) dilute H_2SO_4

(d) SO_2

Q.2 Bad conductor of electricity is

(a) HF (b) HCl

(c) HBr (d) HI

Q.3 Chlorine reacts with sodium hydroxide under various conditions to give

(a) Sodium chloride (b) Sodium hypochlorite

(c) Sodium chlorate (d) All of these

Q.4 The strongest acid amongst the following is

(a) $HClO_4$ (b) $HClO_3$

(c) $HClO_2$ (d) HClO

Q.5 Which of the following noble gas does not have an octet of electrons in its outermost shell?

(a) Neon (b) Radon

(c) Argon (d) Helium

RESPONSE GRID	1. ⓐⓑⓒⓓ	2. ⓐⓑⓒⓓ	3. ⓐⓑⓒⓓ	4. ⓐⓑⓒⓓ	5. ⓐⓑⓒⓓ

Space for Rough Work

Q.6 Nitric acid converts iodine into

(a) Iodic acid

(b) Hydroiodic acid

(c) Iodine nitrate

(d) Iodine pentaoxide

Q.7 As the atomic number of halogens increases, the halogens

(a) Lose the outermost electrons less readily

(b) Become lighter in colour

(c) Become less denser

(d) Gain electrons less readily

Q.8 Which of the following will displace the halogen from the solution of the halide ?

(a) Br_2 added to NaCl solution

(b) Cl_2 added to KCl solution

(c) KCl added to NaF solution

(d) Br_2 added to KI solution

Q.9 In the preparation of chlorine from HCl, MnO_2 acts as

(a) Oxidising agent

(b) Reducing agent

(c) Catalytic agent

(d) Dehydrating agent

Q.10 KI when heated with conc. H_2SO_4 gives

(a) HI (b) I_2

(c) HIO_3 (d) KIO_3

Q.11 Sodium chloride when heated with conc. H_2SO_4 and solid potassium dichromate gives

(a) Chromic chloride (b) Chromyl chloride

(c) Chromous chloride (d) None of these

Q.12 Which of the following halogens is solid at room temperature ?

(a) Chlorine (b) Iodine

(c) Bromine (d) Fluorine

Q.13 Beilstein test is used for

(a) N_2 (b) Cl

(c) Na (d) CO_2

Q.14 White enamel of our teeth is

(a) $Ca_3(PO_4)_2$ (b) CaF_2

(c) $CaCl_2$ (d) $CaBr_2$

Q.15 When iodine reacts with NaF, NaBr and NaCl

(a) It gives mixture of F_2, Cl_2 and Br_2

(b) It gives chlorine

(c) It gives bromine

(d) None of these

Q.16 The weakest acid HX (X = F, Cl, Br, I) is

(a) HF (b) HCl

(c) HBr (d) HI

Q.17 The charcoal maintained at 100° C absorbs

(a) He and Kr (b) He and Ar

(c) Ar, Kr, Xe (d) He and Ne

Q.18 Deep sea divers used to respirate a mixture of

(a) Oxygen and argon (b) Oxygen and helium

(c) Oxygen and nitrogen (d) Oxygen and hydrogen

Q.19 In XeF_2, XeF_4, XeF_6 the number of lone pairs on Xe is respectively

(a) 2, 3, 1 (b) 1, 2, 3

(c) 4, 1, 2 (d) 3, 2, 1

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	

Space for Rough Work

Q.20 Among the following molecule

(i) XeO_3 (ii) $XeOF_4$

(iii) XeF_6

Those having same number of lone pairs on Xe are

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

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

Q.21 Which one of the following statements regarding helium is incorrect ?

(a) It is used to produce and sustain powerful superconducting magnets

(b) It is used as a cryogenic agent for carrying out experiments at low temperatures

(c) It is used to fill gas balloons instead of hydrogen because it is lighter and non- inflammable

(d) It is used in gas-cooled nuclear reactors

DIRECTIONS (Q.22-Q.24) : In the following questions, more than one of the answers given are correct. Select the correct answers and mark it according to the following codes:

Codes :

(a) 1, 2 and 3 are correct **(b)** 1 and 2 are correct

(c) 2 and 4 are correct **(d)** 1 and 3 are correct

Q.22 Which of the following statements are true?

(1) HOCl is a stronger acid than HOBr

(2) Among halide ions, iodide is the most powerful reducing agent

(3) Fluorine is the only halogen that does not show a variable oxidation state

(4) HF is a stronger acid than HCl

Q.23 Which of the following statements are not correct?

(1) Only chlorine and bromine form oxy acids

(2) All halogens form oxy acids

(3) Only iodine forms oxy acids

(4) All halogens, except fluorine, form oxy acids

Q.24 Which statements are correct ?

(1) Electronegativity of fluorine is maximum

(2) Electron affinity of fluorine is maximum

(3) Melting point of fluorine is minimum in its group

(4) Boiling point of fluorine is maximum in its group

DIRECTIONS (Q.25-Q.27) : Read the passage given below and answer the questions that follows :

The noble gases have closed-shell electronic configuration and are monoatomic gases under normal conditions. The low boiling points of the lighter noble gases are due to weak dispersion forces between the atoms and the absence of other interatomic interactions.

The direct reaction of xenon with fluorine leads to a series of compounds with oxidation numbers +2, +4 and +6. XeF_4 reacts violently with water to given XeO_3. The compounds of xenon exhibit rich stereochemistry and their geometries can be deduced considering the total number of electron pairs in the valence shell.

Q.25 Argon is used in arc welding because of its

(a) low reactivity with metal

(b) ability to lower the melting point of metal

(c) flammability

(d) high calorific value

Q.26 The structure of XeO_3 is

(a) linear

(b) planar

(c) pyramidal

(d) T-shaped

Q.27 XeF_4 and XeF_6 are expected to be

(a) oxidizing

(b) reducing

(c) unreactive

(d) strongly basic

RESPONSE GRID					
	20. ⓐⓑⓒⓓ	**21.** ⓐⓑⓒⓓ	**22.** ⓐⓑⓒⓓ	**23.** ⓐⓑⓒⓓ	**24.** ⓐⓑⓒⓓ
	25. ⓐⓑⓒⓓ	**26.** ⓐⓑⓒⓓ	**27.** ⓐⓑⓒⓓ		

Space for Rough Work

DIRECTIONS (Q. 28-Q.30) : Each of these questions contains two statements: Statement-1 (Assertion) and Statement-2 (Reason). Each of these questions has four alternative choices, only one of which is the correct answer. You have to select the correct choice.

(a) Statement-1 is True, Statement-2 is True; Statement-2 is a correct explanation for Statement-1.

(b) Statement-1 is True, Statement-2 is True; Statement-2 is NOT a correct explanation for Statement-1.

(c) Statement-1 is False, Statement-2 is True.

(d) Statement-1 is True, Statement-2 is False.

Q.28 Statement-1 : The fluorine has lower reactivity.
Statement-2 : F - F bond has low bond dissociation energy.

Q.29 Statement-1 : Halogens do not occur in free state.
Statement-2 Halogens are highly reactive.

Q.30 Statement-1 : PbI_4 is not a stable compound.
Statement-2 : Iodide stabilizes higher oxidation state.

RESPONSE GRID	28. ⓐ ⓑ ⓒ ⓓ	29. ⓐ ⓑ ⓒ ⓓ	30. ⓐ ⓑ ⓒ ⓓ

DAILY PRACTICE PROBLEM SHEET 42 - CHEMISTRY			
Total Questions	30	Total Marks	120
Attempted		Correct	
Incorrect		Net Score	
Cut-off Score	36	Qualifying Score	60
Success Gap = Net Score – Qualifying Score			
Net Score = (Correct × 4) – (Incorrect × 1)			

Space for Rough Work

DAILY PRACTICE PROBLEMS

CHEMISTRY SOLUTIONS

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1. **(a)** $Cl_2 + 2KBr \rightarrow 2KCl + Br_2$
A more electronegative halogen can displaces less electronegative halogen.

2. **(a)** Due to H-Bonding free ions are not present in anhy. solution of HF. Hence, it is bad conductor of electricity.

3. **(d)** $\underset{\text{(dil.)}}{2NaOH + Cl_2} \xrightarrow{\text{Cold}} NaCl + \underset{\text{Sod. hypochlorite}}{NaClO} + H_2O$

$6NaOH + 3Cl_2 \xrightarrow{\text{heat}} 5NaCl + NaClO_3 + 3H_2O$

4. **(a)** $\overset{+7}{HClO_4} > \overset{+5}{HClO_3} > \overset{+3}{HClO_2} > \overset{+1}{HClO}$
As the oxidation no. of halogen increases acidic character increases.

5. **(d)** He has 2 electrons in its outermost shell.

6. **(a)** $I_2 + 10HNO_3 \rightarrow 2HIO_3 + 10NO_2 + 4H_2O$

7. **(d)** As the atomic number increases electronegativity decreases. Hence, tendency to gain electron decreases.

8. **(d)** $Br_2 + 2KI \rightarrow I_2 + 2KBr$. Consult as also.

9. **(a)** $\overset{+4}{MnO_2} + 4HCl \xrightarrow{\text{Reduction}} \overset{+2}{MnCl_2} + 2H_2O + Cl_2$

10. **(b)** $KI + H_2SO_4 \xrightarrow{\Delta} KHSO_4 + HI$

$H_2SO_4 + 2HI \rightarrow 2H_2O + I_2 + SO_2 \uparrow$

11. **(b)** $4NaCl + K_2Cr_2O_7 + 3H_2SO_4 \rightarrow$

$K_2SO_4 + 2Na_2SO_4 + \underset{\text{Chromyl chloride}}{2CrO_2Cl_2} + 3H_2O$

12. **(b)** F_2, Cl_2 } gases
Br_2 } liquid
I_2 } solid
As we go down the group vander Waal forces increases. Hence, physical state changes from gas to solid.

13. **(b)** Beilstein test- In this test organic compound is heated on a copper wire in a flame. The appearance of a green or bluish green flame due to the formation of volatile cupric halides indicate the presence of halogens in the organic compound. (It does not tell which halogen is actually present).

14. **(b)** The enamel of our teeth is the hardest substance in the body made up of CaF_2 and dentine below it is made up of $Ca_3(PO_4)_2$.

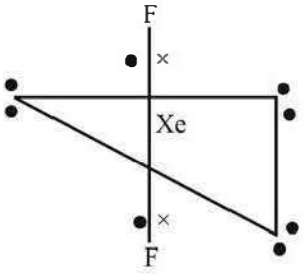
15. **(d)** $I_2 + NaF \longrightarrow$
$I_2 + NaBr \longrightarrow$ } No reaction
$I_2 + NaCl \longrightarrow$
Because I_2 is least electronegative among halogens. Consult Q.1 also.

16. **(a)** $\underset{\text{Acidic character decreasing order}}{HI > HBr > HCl > HF}$

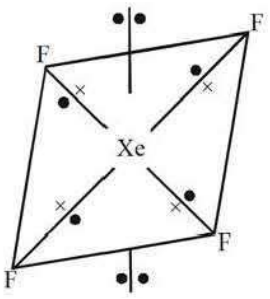
17. **(c)** Except He, all other noble gases are adsorbed by coconut charcoal at low temperatures. The extent of adsorption increases as the atomic size of the noble gas increases.

18. **(b)** An oxygen- helium mixture is used for artificial respiration in deep sea diving instead of air because nitrogen present in air dissolves in blood under high pressure when sea diver goes into deep sea. When he comes to the surface. nitrogen bubbles out of the blood due to decrease in pressure, causing pains. This disease is called "bends".

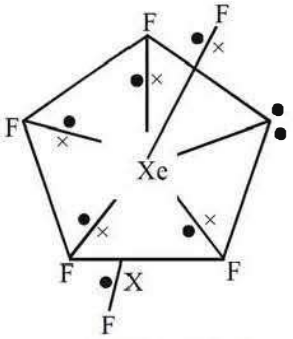
19. **(d)**



sp^3 hybridization

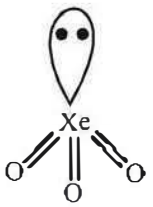


sp^3d^2 hybridization

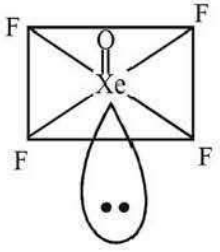


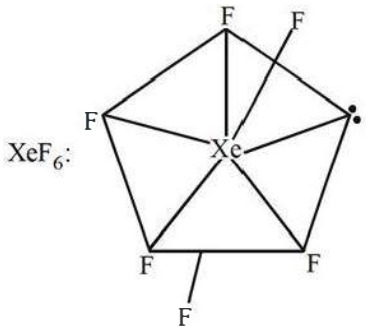
sp^3d^3 hybridization

20. **(d)** XeO_3:



$XeOF_4$:





XeF_6:

21. **(c)** Helium is twice as heavy as hydrogen, its lifting power is 92% of that of hydrogen. Helium has the lowest melting and boiling point of any element which makes liquid helium an ideal coolant for many extremely low temperature applications such as super conducting magnet and cryogenic research where temperature close to absolute zero are needed.

22. **(a)** HF is a weak acid due to intermolecular hydrogen bonding.

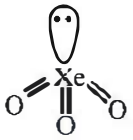
23. **(a)** All halogens except fluorine form oxy acids. Hence, statement (4) is correct. Remaining options 1, 2, 3 are incorrect.

24. **(d)** Electron affinity of Chlorine is maximum

Element-	F	Cl	Br	I
E.A. kJ/mole-	332.6	348.5	324.7	295.5
Boiling pt (°C)	–188.1	–34.6	59.5	185.2
Melting pt (°C)	–219	–101	–7	114

25. **(a)** Argon, being a noble gas, will not react with the metals, thus, can be used in arc welding.

26. **(c)** In XeO_3, there are 4 electron pairs around central atom. Out of which, 3 are bonding electron pairs and one is non-bonding electron pair. This combination provides sp^3-hybridization and pyramidal shape.



27. **(a)** All xenon fluorides are strongly oxidizing, XeF_4 can act as reducing agent (with F_2) as well as oxidizing agent but XeF_6 can only function as an oxidizing agent.

$$6XeF_4 + 12H_2O \longrightarrow 4Xe + 2XeO_3 + 24HF + 3O_2$$

$$XeF_6 + 3H_2O \longrightarrow XeO_3 + 6HF$$

28. **(c)** The lower value of bond dissociation energy of F-F bond due to longer inter electronic (electron- electron) repulsion between the non-bonding electrons in the $2p$ orbitals of fluorine atom.

29. **(a)** It is fact that halogens are highly reactive as they have seven electrons in their outermost orbit and they want to stabilize by acquiring an electron. Therefor, they do not occur in free state. Here both Statement - I and Statement -2 are true and the Statement -2 is the correct explanation of Statement - 1.

30. **(d)** PbI_4 is not a stable compound because Pb shows (II) oxidation state more frequently than Pb (IV) due to inert pair effect. Iodide can not stabilize higher oxidation states.