DPP - Daily Practice Problems

Name : _____ Date : _____

Start Time : _____ End Time : _____

CHEMISTRY 20

SYLLABUS : *p*-Block Elements (Gp-14)-2

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 Producer gas is a mixture of

(a) CO and N_2 (b) CO_2 and H_2

(c) CO and H_2 (d) CO_2 and N_2

Q2. Thermodynamically, the most stable form of carbon is

(a) diamond (b) graphite

(c) peat (d) coal

Q3. Which of the following allotropic forms of carbon is isomorphous with crystalline silicon ?

(a) Graphite (b) Coal

(c) Coke (d) Diamond

Q4. A metal, M forms chlorides in + 2 and + 4 oxidation states. Which of the following statements about these chlorides is correct ?

(a) MCl_2 is more volatile than MCl_4

(b) MCl_2 is more soluble in anhydrous ethanol than MCl_4

(c) MCl_2 is more ionic than MCl_4

(d) MCl_2 is more easily hydrolysed than MCl_4

Q5. In which of the following silicates, cyclic structure is present?

(a) Mica (b) Asbestos

(c) Emerald (d) Talc

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

Space for Rough Work

Q6. Which of following oxidation states are the most characteristic for lead and tin respectively?
(a) +2, +2 (b) +4, +2
(c) +2, +4 (d) +4, +4

Q.7 The correct order of C – O bond length among CO, CO_3^{2-} and CO_2 is:
(a) $CO < CO_2 < CO_3^{2-}$ (b) $CO_2 < CO_3^{2-} < CO$
(c) $CO < CO_3^{2-} < CO_2$ (d) $CO_3^{2-} < CO_2 < CO$

Q.8 White lead is
(a) Pb_3O_4
(b) PbO
(c) $Pb(CH_3COO)_2 \cdot Pb(OH)_2$
(d) $2PbCO_3 \cdot Pb(OH)_2$

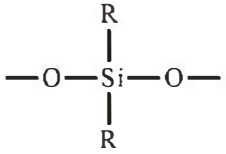
Q.9 Which of the following is a combustion reaction ?
(a) $C + O_2 \rightarrow CO_2$
(b) $CH_4 + 2O_2 \rightarrow CO_2 + 2H_2O$
(c) $2Mg + O_2 \rightarrow 2MgO$
(d) All of these

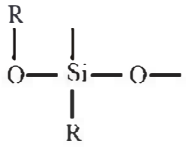
Q.10 The stability of dihalides of Si, Ge, Sn and Pb increases steadily in the sequence
(a) $PbX_2 << SnX_2 << GeX_2 << SiX_2$
(b) $SiX_2 << GeX_2 << SnX_2 << PbX_2$
(c) $GeX_2 << SiX_2 << SnX_2 << PbX_2$
(d) $SiX_2 << GeX_2 << PbX_2 << SnX_2$

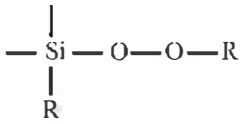
Q.11 Water transported through lead pipes becomes poisonous due to the formation of
(a) $Pb(OH)_2$ (b) PbO
(c) PbO_2 (d) Pb_3O_4

Q.12 The repeating structural unit in silicone is

(a) SiO_2

(b)


(c)


(d)


Q.13 When a mixture of air and steam is passed over red hot coke, the outgoing gas is :
(a) producer gas (b) water gas
(c) coal gas (d) None of these

Q.14 The halide which is not hydrolysed is :
(a) $SiCl_4$ (b) SiF_4
(c) CCl_4 (d) $PbCl_4$

Q.15 The structure and hybridisation of Si in $Si(CH_3)_4$ is
(a) Bent and *sp*
(b) Trigonal and sp^2
(c) Octahedral and dsp^2
(d) Tetrahedral and sp^3

Q.16 The cation which can be precipitated by both HCl and H_2S is :
(a) Pb^{2+} (b) Fe^{3+}
(c) Zn^{2+} (d) Cu^{2+}

Q.17 In graphite, the electrons are
(a) localised on every third carbon atom
(b) present in antibonding orbitals
(c) localised on each carbon atom
(d) spread out between the structure

Q18. What is water glass?
(a) A thin layer of water on glass plate
(b) The fluid like flow of gas
(c) Sodium silicate
(d) Borax soda glass

Q19. Which of the following combines with haemoglobin of the blood to form carboxyhaemoglobin ?
(a) CO (b) CO_2
(c) O_2 (d) N_2

Q.20 In silicon dioxide,
(a) Each silicon atom is surrounded by four oxygen atoms and each O-atom is bonded to two Si-atoms.
(b) Each Si-atom is surrounded by two O-atoms and each O-atom is bonded to two Si-atoms.
(c) Si-atom is bonded to two O-atoms
(d) There are double bonds between Si and O-atoms.

RESPONSE GRID					
	6. ⓐⓑⓒⓓ	7. ⓐⓑⓒⓓ	8. ⓐⓑⓒⓓ	9. ⓐⓑⓒⓓ	10. ⓐⓑⓒⓓ
	11. ⓐⓑⓒⓓ	12. ⓐⓑⓒⓓ	13. ⓐⓑⓒⓓ	14. ⓐⓑⓒⓓ	15. ⓐⓑⓒⓓ
	16. ⓐⓑⓒⓓ	17. ⓐⓑⓒⓓ	18. ⓐⓑⓒⓓ	19. ⓐⓑⓒⓓ	20. ⓐⓑⓒⓓ

Space for Rough Work

Q.21 The material used in solar cells contains :

(a) Cs (b) Si

(c) Sn (d) Ti

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 correct?

(1) GeO, SnO and PbO are basic and ionic than the corresponding GeO_2, SnO_2 and PbO_2.

(2) GeO is acidic while SuO and PbO are amphoteric.

(3) The mixed oxide Pb_3O_4 contains Pb^{2+} and Pb^{4+} ions.

(4) Ge^{2+} and Sn^{2+} are strong oxidising agents.

Q.23 Select the correct statement(s) from the following-

(1) Graphite can be converted into diamond.

(2) Graphite is thermodynamically more unstable form of carbon.

(3) Graphite is used as a moderator in nuclear reactors.

(4) Graphite is less reactive than diamond.

Q.24 Which of the following statements are correct for CO?

(1) CO is an important fuel.

(2) CO is poisonous gas and a neutral oxide.

(3) It can be prepared by dehydrating formic acid with conc. H_2SO_4.

(4) CO is 20% in atmosphere.

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

Carbon shows allotropy. The various allotropic forms of carbon can be broadly classified into two classes :

(a) Crystalline form and

(b) Amorphous form

Diamond and graphite are the two crystalline forms of carbon. In diamond, the carbon atoms are arranged tetrahedrally while in graphite, the carbon atoms are arranged in regular hexagons in flat parallel layers.

Q.25 In CO_3^{2-}, carbon atom (C) shows –

(a) sp^2 hybridisation

(b) sp^3 hybridisation

(c) sp hybridisation

(d) None of these

Q.26 In diamond, C atoms show–

(a) sp^2 hybridisation

(b) sp^3 hybridisation

(c) sp hybridisation

(d) None of these

Q.27 In graphite, C atoms show –

(a) sp^2 hybridisation

(b) sp^3 hybridisation

(c) sp hybridisation

(d) None of these

RESPONSE GRID					
	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 : SiF_6^{2-} is known but $SiCl_6^{2-}$ is not.

Statement 2 : Size of fluorine is small and its lone pair of electrons interacts with d-orbitals of Si strongly.

Q.29 Statement 1 : Si – Si bonds are much weaker than Si – O bonds.

Statement 2 : Silicon forms double bonds with itself.

Q.30 Statement 1 : PbI_4 is a stable compound.

Statement 2 : Iodine stabilizes lower oxidation state.

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

DAILY PRACTICE PROBLEM SHEET 20 - 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)**

(2) **(b)** Graphite is thermodynamically more stable than diamond because its free energy of formation is 1.9 kJ mol^{-1} lower at room temperature and ordinary P.

(3) **(d)** Each silicon atom in crystalline structure of Si is tetrahedrally surrounded by four other Si atoms. This structure is similar to that of diamond.

(4) **(c)** Compounds in lower O.S. are more ionic than compounds in higher O.S. Thus, MCl_2 is more ionic than MCl_4.

(5) **(c)** Beryl has cyclic structure. Beryl containing 1-2% Cr having grass green colour is called emerald.

(6) **(c)** Due to inert pair effect, + 2 O.S. of Pb is more stable while + 4 O.S. of Sn is more stable. Thus, (c) is the correct option.

(7) **(a)** The B.O. of CO is 2.5, that of CO_2 is 2 while that of CO_3^{2-} is 1.5. As B.O. decreases, C–O bond length increases. Thus, B.L. of $CO < CO_2 < CO_3^{2-}$.

(8) **(d)** Basic lead carbonate, $2PbCO_3.Pb(OH)_2$ is called white lead.

(9) **(d)**

(10) **(b)** Inert pair effect becomes more predominant down the group and hence, the stability of dihalides increases down the group, i.e., option (b) is correct.

(11) **(a)** $2Pb + O_2 + 2H_2O \rightarrow 2Pb(OH)_2$. This $Pb(OH)_2$ makes water poisonous. The dissolution of Pb in H_2O is called plumbosolvency.

(12) **(b)**

(13) **(d)** H_2 and CO_2 gases are formed.

$$2H_2O + O_2 + 2C \rightarrow 2H_2 + 2CO_2$$

(14) **(c)** Due to the absence of *d*-orbitals in C, CCl_4 is not hydrolysed.

(15) **(d)** The structure is tetrahedral and hybridisation of Si is sp^3.

(16) **(a)** Pb^{2+} forms a precipitate of $PbCl_2$ (white) with HCl and PbS (black) with H_2S.

(17) **(d)** In graphite, electrons are spread (delocalised) between the structure.

(18) **(c)** Water glass is sodium silicate.

(19) **(a)** **(20)** **(a)**

(21) **(b)** Due to its semi-conducting nature, Si is used in solar cells.

(22) **(a)** Increased stability of lower valent states on descending a group is illustrated by the fact that Ge^{2+} and Sn^{2+} are strong reducing agents. Pb_3O_4 (red lead) is 2PbO. PbO_2 and thus contains both Pb^{2+} and Pb^{4+} ions.

(23) **(d)** The heat of combustion of graphite is –94.052 kcal/mole and that of diamond is –94.505 kcal/mole. However, it can be converted into diamond at 16000°C by a pressure of 5,000 to 60,000 atm.

Graphite is more reactive than diamond due to the presence of a mobile electron on each carbon atom.

(24) **(a)**

(1) It burns in air and evolves a considerable amount of heat.

(2) It forms carboxyhaemoglobin with the haemoglobin of the blood and reduces O_2 carrying capacity of H_b.

(3) $HCOOH + H_2SO_4 \rightarrow CO + H_2O$

(25) **(a)** In CO_3^{2-}, carbon atom (C) shows sp^2 hybridisation.

(26) **(b)** In diamond, the carbon atoms are arranged tetrahedrally i.e., sp^3 hyrbidisation of C. Each C atom is linked to its neighbours by four single covalent bonds.

(27) **(a)** In graphite, the carbon atoms are arranged in regular hexagons in flat parallel layers. Each carbon atom in these layers is bonded to three others by sp^2 covalent bonds.

(28) **(a)** (i) Due to smaller size of F; steric repulsions will be less in SiF_6^{2-}.

(ii) Interaction of F lone pair electrons with Si is stronger than that of chlorine lone pairs.

(29) **(d)** Si – Si bonds are weaker than Si – O bonds. Si has no tendency to form double bonds with itself.

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