

# The d- and f-Block Elements

NEET previous year questions · Chemistry

7 questions from the official papers: NEET 2026 (3), Re-NEET 2026 (3), NEET 2020 (1). Each is followed by its answer and a worked solution written by BrainIt. Generated on 23 October 2026.



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### 1. NEET 2026 · Q47

Match List I with List II:

| List I        | List II                                          |
|---------------|--------------------------------------------------|
| P) $V_2O_5$   | I) Preparation of ammonia from $N_2/H_2$ mixture |
| Q) Fe         | II) Polymerisation of alkynes                    |
| R) $PdCl_2$   | III) Preparation of $H_2SO_4$ and $SO_2$         |
| S) Ni complex | IV) Oxidation of ethyne to ethanal               |

- (1) P-III, Q-IV, R-I, S-II    (2) P-IV, Q-I, R-III, S-II  
(3) P-II, Q-I, R-IV, S-III    (4) P-III, Q-I, R-IV, S-II

#### Answer (4)

**Sol.**  $V_2O_5$  is the contact-process catalyst linked with  $H_2SO_4/SO_2$  chemistry (III); Fe is the Haber-process catalyst for ammonia from  $N_2/H_2$  (I);  $PdCl_2$  catalyses Wacker oxidation of ethyne/ethene to ethanal (IV); and Ni complexes catalyse polymerisation of alkynes (II). Hence P-III, Q-I, R-IV, S-II.

### 2. NEET 2026 · Q66

Although +3 oxidation state is most common in lanthanoids, cerium still shows +4 oxidation state because:

- (1) After losing one more electron, it acquires  $4f^{14}$  electronic configuration.  
(2) Its nearest inert gas is Radon.  
(3) Its atomic number is 61.  
(4) After losing one more electron, it acquires  $4f^0$  electronic configuration.

#### Answer (4)

**Sol.** Cerium ( $Z = 58$ ) has the configuration  $[Xe]4f^1 5d^1 6s^2$ ; on going to  $Ce^{4+}$  it loses its outer electrons to reach the especially stable, empty  $4f^0$  (noble-gas-like) configuration, which is why it readily shows the +4

state. The options citing  $4f^{14}$ , radon, or atomic number 61 are factually wrong for cerium.

### 3. NEET 2026 · Q80

The calculated 'spin-only' magnetic moment of  $Ti^{2+}$  ( $3d^2$ ) is:

- (1) 5.92 BM    (2) 3.87 BM    (3) 2.84 BM    (4) 4.90 BM

#### Answer (3)

**Sol.** The spin-only magnetic moment is  $\mu = \sqrt{n(n+2)}$  Bohr magneton (BM), where  $n$  is the number of unpaired electrons.  $Ti^{2+}$  is  $[Ar]3d^2$  with 2 unpaired electrons, so  $\mu = \sqrt{2(2+2)} = \sqrt{8} \approx 2.84$  BM.

### 4. Re-NEET 2026 · Q61

Given below are two statements: One is labelled as Assertion A and the other is labelled as Reason R.

Assertion (A): Generally, 3d transition metals have high melting points.

Reason (R): Involvement of 3d-electrons in addition to 4s-electrons in the interatomic metallic bonding.

In light of the above statements, choose the most appropriate answer from the options given below:

- (1) Both A and R are correct and R is the correct explanation of A  
(2) Both A and R are correct and R is NOT the correct explanation of A  
(3) A is correct but R is not correct.  
(4) A is not correct but R is correct

#### Answer (1)

**Sol.** Melting point tracks the strength of the metallic bond, which depends on how many electrons each atom contributes to the delocalised sea. In s-block metals

only the ns electrons participate, but in the 3d series the unpaired 3d electrons join the 4s electrons in bonding, producing much stronger interatomic attraction and correspondingly high melting points. The trend peaks near the middle of the series, where the number of unpaired d electrons is greatest. R is therefore the correct explanation of A. NCERT Class 12, The d- and f-Block Elements.

5. Re-NEET 2026 · Q67

The lanthanide ion having four unpaired electrons is (Given : Atomic numbers of Ce = 58, Nd = 60, Tb = 65 and Ho = 67)

- (1)  $\text{Nd}^{3+}$  (2)  $\text{Ce}^{3+}$   
(3)  $\text{Tb}^{3+}$  (4)  $\text{Ho}^{3+}$

Answer (4)

**Sol.** Lanthanoid tripositive ions have the configuration  $[\text{Xe}]4f^n$ , where n is the atomic number minus 57. That gives  $\text{Ce}^{3+} = 4f^1$ ,  $\text{Nd}^{3+} = 4f^3$ ,  $\text{Tb}^{3+} = 4f^8$  and  $\text{Ho}^{3+} = 4f^{10}$ . Filling seven f orbitals by Hund's rule,  $4f^{10}$  places three pairs and leaves FOUR unpaired electrons, so  $\text{Ho}^{3+}$  is the answer. NCERT Class 12, The d- and f-Block Elements (lanthanoids).

6. Re-NEET 2026 · Q85

The green paramagnetic species formed by heating  $\text{KMnO}_4$  at 513 K is

- (1)  $\text{K}_2\text{MnO}_4$  (2)  $\text{Mn}_3\text{O}_4$  (3)  $\text{MnO}$  (4)  $\text{KO}_2$

Answer (1)

**Sol.** Heating permanganate near 513 K decomposes it as  $2\text{KMnO}_4 \rightarrow \text{K}_2\text{MnO}_4 + \text{MnO}_2 + \text{O}_2$  at 513 K. The manganate ion  $\text{MnO}_4^{2-}$  has manganese in the +6 state with a  $d^1$  configuration, so it is both intensely green and paramagnetic - permanganate itself, with  $d^0$  manganese(VII), is purple and diamagnetic. NCERT Class 12, The d- and f-Block Elements (potassium permanganate).

7. NEET 2020 · Q111

Identify the incorrect statement.

- (1) Transition metals and their compounds are known for catalytic activity because they can adopt multiple oxidation states and form complexes.  
(2) Interstitial compounds form when small atoms such as H, C or N occupy spaces in metal crystal lattices.  
(3) The oxidation states of chromium in  $\text{CrO}_4^{2-}$  and  $\text{Cr}_2\text{O}_7^{2-}$  are not the same.  
(4)  $\text{Cr}^{2+}$  ( $d^4$ ) is a stronger reducing agent than  $\text{Fe}^{2+}$  ( $d^6$ ) in water.

Answer (3)

**Sol.** Chromium is +6 in both  $\text{CrO}_4^{2-}$  and  $\text{Cr}_2\text{O}_7^{2-}$ , so the statement that their oxidation states differ is incorrect. The other three statements are valid. Chapter: The d- and f-Block Elements.

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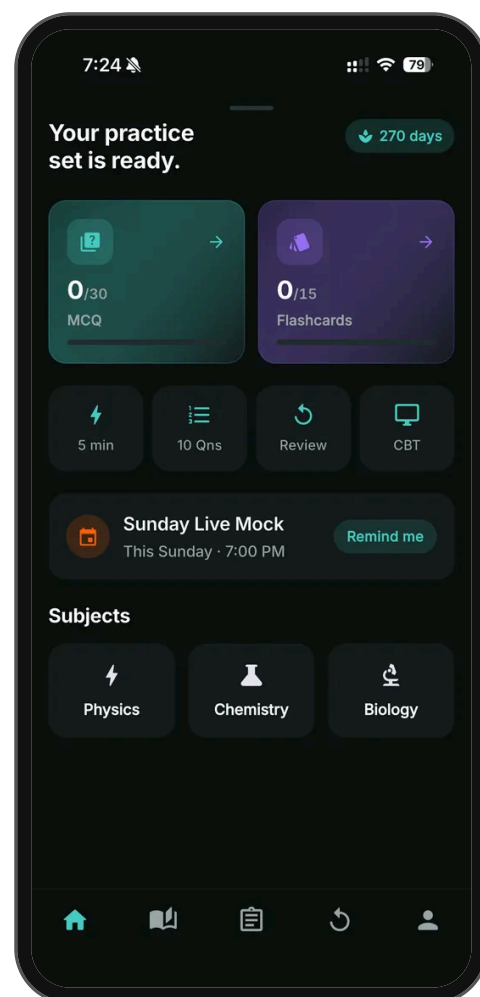
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