The d- and f-Block Elements: Chapter Introduction

Iron bridges, copper wires and bright blue, purple and orange solutions all come from one part of the periodic table. The d-block (groups 3–12) fills d orbitals; the f-block (two rows below) fills f orbitals. Variable oxidation states, colour, magnetism and catalysis make them special.

Name: Date: Score: ____ / 15

A. Fill in the blanks

1. The d-block occupies groups 3 to ____ of the periodic table.

2. A d subshell has ____ orbitals.

3. The lanthanoids fill the ____ orbitals.

4. The actinoids fill the ____ orbitals.

B. True or False

5. The f-block is placed in two separate rows at the bottom of the periodic table. True / False

6. Transition metals usually show only one oxidation state. True / False

7. Copper is a d-block element. True / False

C. Assertion and reason

8. Assertion (A): Many transition-metal compounds are coloured.
Reason (R): Colour is one of the special properties of the d-block.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

9. Assertion (A): The f-block is drawn below the main table.
Reason (R): Each f series has 14 elements that would widen periods 6 and 7.

(a) Both A and R are true, and R explains A
(b) Both A and R are true, but R does not explain A
(c) A is true, R is false
(d) A is false, R is true

Answer: _____

D. Choose the correct option

10. The d-block elements fill the:

(a) s orbitals
(b) p orbitals
(c) d orbitals
(d) f orbitals

Answer: _____

11. Which is an f-block element?

(a) Fe
(b) Cu
(c) Ce
(d) Cr

Answer: _____

12. Which is NOT typical of transition metals?

(a) variable oxidation states

(b) coloured compounds

(c) catalytic activity

(d) a single fixed valency

Answer: _____

E. Numerical problems

13. How many electrons can an f subshell hold?

F. Short answer questions

14. Name four special properties of transition metals.

G. Match the columns

15. Match each item in Column A with the correct item in Column B.

Column A	Column B	Your answer
1. d-block	(a) purple compound	1 → ____
2. f-block	(b) groups 3–12	2 → ____
3. Iron	(c) Haber process catalyst	3 → ____
4. $KMnO_4$	(d) lanthanoids and actinoids	4 → ____

Detailed solutions

1. 12

2. 5

3. 4f

4. 5f

5. True. The lanthanoids and the actinoids.

6. False. They show variable oxidation states (Mn: +2 to +7).

7. True. Copper is in group 11.

8. (a) R explains A.

9. (a) R explains A.

10. (c) d orbitals. The name gives it away.

11. (c) Ce. Cerium is a lanthanoid.

12. (d) a single fixed valency. They show several oxidation states.

13. 7 orbitals, 2 electrons each. **Answer: 14**

14. Variable oxidation states, coloured compounds, paramagnetism, catalytic activity (also complexes, alloys, high melting points).

15. 1 → (b), 2 → (d), 3 → (c), 4 → (a). Each item matches its description.