Zinc Is in the d-Block, So Why Is It Not a Transition Metal?

A transition element has an incompletely filled d subshell in its atom or in a common ion. Iron ($3d^6$) passes; copper ($3d^{10}$ atom) passes through Cu^{2+} ($3d^9$); zinc stays $3d^{10}$ even as Zn^{2+}, so Zn, Cd and Hg are d-block but not transition metals.

Name: Date: Score: ____ / 15

A. Fill in the blanks

1. A transition element has an incompletely filled ____ subshell in its atom or a common ion.

2. The configuration of Cu^{2+} is 3d____.

3. When Zn forms Zn^{2+}, the two ____ electrons leave.

4. Zn, Cd and Hg belong to group ____.

B. True or False

5. Zinc is a d-block element. True / False

6. Zinc is a transition metal. True / False

7. Copper is a transition metal even though its atom is $3d^{10}$. True / False

C. Assertion and reason

8. Assertion (A): Copper is a transition metal.
Reason (R): Cu^{2+} has an incompletely filled 3d subshell.

(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): Mercury is not regarded as a transition metal.
Reason (R): Mercury is a liquid at room temperature.

(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. Which is NOT a transition metal?

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

Answer: _____

11. The configuration of Fe is:

(a) $[Ar]\ 3d^6\ 4s^2$
(b) $[Ar]\ 3d^8$
(c) $[Ar]\ 3d^5\ 4s^3$
(d) $[Ar]\ 4s^2\ 3d^4$

Answer: _____

12. In forming ions, d-block atoms lose first their:

(a) 3d electrons
(b) 4s electrons
(c) 4p electrons
(d) core electrons

Answer: _____

E. Numerical problems

13. How many 3d electrons does Cu^{2+} have?

F. Short answer questions

14. Is scandium ($3d^1\ 4s^2$; $Sc^{3+}\ 3d^0$) a transition element? Why?

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. Fe	(a) $3d^{10}$	1 → ____
2. Cu^{2+}	(b) Hg	2 → ____
3. Zn^{2+}	(c) $3d^6\ 4s^2$	3 → ____
4. Not a transition metal	(d) $3d^9$	4 → ____

Detailed solutions

1. d

2. 9

3. 4s

4. 12

5. True. It is in group 12.

6. False. Zn and Zn^{2+} are both $3d^{10}$.

7. True. Cu^{2+} is $3d^{9}$.

8. (a) R explains A.

9. (b) Both true; R does not explain A: the reason is its full $5d^{10}$ subshell.

10. (c) Zn. Always d^{10}.

11. (a) [Ar] $3d^{6}$ $4s^{2}$. 26 electrons.

12. (b) 4s electrons. 4s leaves before 3d.

13. 29 − 2 = 27 electrons; [Ar] has 18. **Answer: 9**

14. Yes: its atom has an incomplete 3d subshell, which satisfies the definition.

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