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Group Properties & Reactivity Series

Exam — Periodic Table & Trends

Beginner-friendly Pre-med/IB-style questions on periodic table group properties (Group 1, 2, 17, 18), how groups react with each other (especially metals + halogens, halogen displacement), and using the metal reactivity series to predict reactions, extraction, and corrosion protection.

45 items — Printable Exam

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1 **Elements in the same group (column) of the periodic table tend to have similar chemical properties mainly because they have the same number of:**

A Protons

B Neutrons

C Electron shells

D Valence (outer-shell) electrons

E Isotopes

2 **Which list contains ONLY alkali metals (Group 1)?**

A Li, Na, K

B Mg, Ca, Sr

C F, Cl, Br

D He, Ne, Ar

E Fe, Co, Ni

3 **An element in Group 17 (a halogen) most commonly forms which ion in ionic compounds?**

A $1+$

B $2+$

C $3+$

D $1-$

E $2-$

4 **An element in Group 2 most commonly forms which ion in ionic compounds?**

A 1+

B 2+

C 3+

D 1−

E 2−

5 **Which statement best compares Group 1 metals with Group 2 metals in the same period?**

A Group 2 metals form 1+ ions; Group 1 metals form 2+ ions

B Group 1 metals are generally more reactive and form 1+ ions; Group 2 metals are less reactive and form 2+ ions

C Group 1 metals are nonmetals; Group 2 metals are noble gases

D Group 1 metals tend to gain electrons; Group 2 metals tend to gain electrons

E Group 2 metals are always more reactive than Group 1 metals

6 **Alkali metals are commonly stored under oil mainly to prevent them reacting with:**

A Nitrogen in the air

B Moisture (water) in the air

C Glass containers

D Other metals

E Light (photons)

7 **Reactivity of Group 1 metals increases down the group mainly because:**

A The nucleus gets smaller

B The outer electron is farther from the nucleus and more shielded, so it is lost more easily

C They gain electrons more easily

D They have fewer electron shells

E They become less metallic

8 **When a Group 1 metal reacts with water, the products are generally:**

A Metal chloride + oxygen gas

B Metal hydroxide + hydrogen gas

C Metal oxide + carbon dioxide

D Metal nitrate + nitrogen gas

E Metal sulfate + sulfur dioxide

9 **Which equation is correctly balanced for potassium reacting with water?**

A $K + H2O \rightarrow KOH + H$

B $2K + H2O \rightarrow 2KOH + H2$

C $2K + 2H2O \rightarrow 2KOH + H2$

D $K2 + 2H2O \rightarrow 2KOH + H2$

E $2K + H2O \rightarrow K2O + H2$

10 **Why does the water become alkaline when sodium reacts with it?**

A Because sodium releases H^+ ions into the solution

B Because sodium hydroxide forms, producing OH− ions in solution

C Because hydrogen gas dissolves and makes OH− ions

D Because sodium turns into chlorine

E Because oxygen ions always make solutions alkaline

11 **Compared with Group 1 metals, Group 2 metals generally react less vigorously with water in the same period mainly because:**

A Group 2 metals are nonmetals

B Group 2 metals must lose two electrons to form stable ions, which is generally harder than losing one

C Group 2 metals have no valence electrons

D Group 2 metals gain electrons instead of losing them

E Water cannot react with 2+ ions

12 **Which Group 2 metal is expected to react most vigorously with cold water (trend down the group)?**

A Be

B Mg

C Ca

D Ba

E Al

13 **Which equation is correctly balanced for calcium reacting with water?**

A $Ca + H2O \rightarrow CaOH + H$

B $Ca + 2H2O \rightarrow Ca(OH)2 + H2$

C $2Ca + H2O \rightarrow 2CaOH + H2$

D $Ca2 + 2H2O \rightarrow Ca(OH)2 + H2$

E $Ca + H2O \rightarrow CaO + H2$

14 **Magnesium reacts very slowly with cold water but reacts more readily with steam. The main products of magnesium reacting with steam are:**

A $Mg(OH)2$ and $O2$

B MgO and $H2$

C $MgH2$ and $O2$

D $MgCl2$ and $H2$

E $MgCO3$ and $H2$

15 **Halogens (Group 17) commonly exist as elemental molecules with which formula type?**

A X

B X2

C X3

D X4

E X8

16 **Reactivity of halogens generally changes down Group 17 in which way?**

A Increases

B Decreases

C Stays exactly the same

D Becomes unpredictable with no pattern

E Increases then decreases

17 **Why do halogens become less reactive down Group 17?**

A They have fewer electron shells

B They gain protons more easily

C The attraction for an added electron decreases due to increased atomic radius and shielding

D They stop forming covalent bonds

E They become metals

18 **Which halogen is a liquid at room temperature?**

A Fluorine

B Chlorine

C Bromine

D Iodine

E Neon

19 **Chlorine gas is bubbled through a solution of potassium bromide (KBr). What is the key chemical change?**

A No reaction occurs because bromine is more reactive than chlorine

B Chlorine displaces bromine, forming bromine (Br2) and chloride ions

C Bromine displaces chlorine, forming chloride (Cl−) and bromide ions

D Potassium metal is produced

E A precipitate of KCl forms because KCl is insoluble

20 **Chlorine gas is bubbled through a solution of potassium iodide (KI). Which product is formed from iodide ions?**

A Cl−

B I2

C IO3−

D H2

E K metal

21 **Bromine water is added to a solution of sodium chloride (NaCl). What happens?**

A Chlorine is displaced and chlorine gas forms

B Bromine is displaced and bromine gas forms

C No halogen displacement occurs

D Sodium metal forms

E A precipitate of NaBr forms because NaBr is insoluble

22 **Noble gases (Group 18) are generally unreactive mainly because they:**

A Have no electrons

B Have a full outer electron shell

C Have no neutrons

D Are all liquids at room temperature

E Always form 2+ ions

23 **Which noble gas is most well-known for forming compounds (an exception to 'totally unreactive')?**

A Helium

B Neon

C Argon

D Xenon

E Hydrogen

24 **Which statement correctly describes a metal displacement reaction using the reactivity series?**

A A less reactive metal displaces a more reactive metal from its salt solution

B A more reactive metal displaces a less reactive metal from its salt solution

C Only noble gases can cause displacement reactions

D Displacement happens only when both metals are in Group 1

E Displacement reactions produce water as the main product

25 **Which metal will displace copper from copper(II) sulfate solution ($CuSO_4$) in a typical displacement reaction?**

A Gold (Au)

B Silver (Ag)

C Copper (Cu)

D Zinc (Zn)

E Platinum (Pt)

26 **A strip of zinc metal is placed in blue copper(II) sulfate solution. Which observation best matches what you would expect?**

A No change because copper is more reactive than zinc

B The solution turns more intensely blue and zinc plates onto the strip

C A reddish-brown solid (copper) forms on the zinc, and the blue color fades

D Hydrogen gas bubbles form but copper does not change

E A white precipitate of copper chloride forms

27 **A strip of copper metal is placed in a zinc sulfate solution (ZnSO4). What is most likely to happen?**

A Copper displaces zinc and zinc metal forms

B No reaction because copper is less reactive than zinc

C Hydrogen gas forms because ZnSO4 is an acid

D Copper turns into Cu^{2+} and the solution becomes deep blue immediately

E A precipitate of copper sulfate forms

28 **A piece of magnesium is added to dilute hydrochloric acid (HCl). Which gas is produced?**

A Oxygen (O2)

B Nitrogen (N2)

C Hydrogen (H2)

D Carbon dioxide (CO2)

E Chlorine (Cl2)

29 **Copper metal is placed in dilute hydrochloric acid (HCl). What is most likely to happen at room temperature?**

A Copper reacts vigorously, producing lots of hydrogen gas

B Copper slowly reacts, producing oxygen gas

C No reaction (copper is below hydrogen in the reactivity series)

D Copper forms $CuCl_2$ and chlorine gas immediately

E Copper turns into sodium

30 **Which metal is more reactive according to the typical reactivity series?**

A Copper (Cu) is more reactive than iron (Fe)

B Iron (Fe) is more reactive than copper (Cu)

C Silver (Ag) is more reactive than magnesium (Mg)

D Gold (Au) is more reactive than zinc (Zn)

E Platinum (Pt) is more reactive than potassium (K)

31 **Which metal is below hydrogen in the typical metal reactivity series?**

A Magnesium (Mg)

B Zinc (Zn)

C Iron (Fe)

D Copper (Cu)

E Aluminium (Al)

32 **A metal reacts with cold water to release hydrogen gas. Which statement must be true about this metal (using the reactivity series idea)?**

A It is less reactive than hydrogen

B It is more reactive than hydrogen

C It must be a noble gas

D It must be a halogen

E It must be copper

33 **Aluminium can seem less reactive than expected even though it is high in the reactivity series because:**

A Aluminium is a noble gas

B Aluminium has no valence electrons

C A thin, protective aluminium oxide layer forms on its surface

D Aluminium cannot form ions

E Aluminium always gains electrons instead of losing them

34 **A student says: "Aluminium must be unreactive because it doesn't rust quickly like iron." What is the best correction?**

A Aluminium is unreactive because it is below hydrogen in the reactivity series

B Aluminium is actually reactive, but it is protected by an oxide layer that prevents further corrosion

C Aluminium cannot react with oxygen at all

D Only iron can corrode; other metals cannot

E Aluminium is a nonmetal so it cannot corrode

35 **Which metal is typically extracted from its ore mainly by electrolysis because it is too reactive for carbon reduction?**

A Copper (Cu)

B Iron (Fe)

C Aluminium (Al)

D Tin (Sn)

E Lead (Pb)

36 **Which metal is commonly extracted by reducing its oxide with carbon in a blast furnace (high school-level idea)?**

A Potassium (K)

B Sodium (Na)

C Aluminium (Al)

D Iron (Fe)

E Calcium (Ca)

37 **Why is potassium NOT extracted from potassium oxide using carbon?**

A Because potassium oxide is insoluble

B Because potassium is more reactive than carbon, so its oxide is too stable to be reduced by carbon

C Because carbon can only reduce noble metals

D Because potassium is a nonmetal

E Because potassium has no electrons to gain

38 **Galvanizing iron with zinc helps prevent rusting mainly because:**

A Zinc is less reactive than iron, so it blocks iron from reacting

B Zinc is more reactive than iron and will oxidize first (sacrificial protection), even if the coating is scratched

C Zinc turns iron into a noble gas

D Zinc makes water unable to dissolve oxygen

E Zinc removes all electrons from iron permanently

39 **In a simple cell made from zinc and copper electrodes in an electrolyte, which electrode is more likely to be the anode (the one that oxidizes)?**

A Copper, because it is less reactive and oxidizes more easily

B Zinc, because it is more reactive and loses electrons more readily

C Neither electrode can oxidize in a cell

D Both oxidize at the same rate always

E The noble gas electrode

40 **Which statement correctly describes halogen displacement reactions?**

A A less reactive halogen displaces a more reactive halide from solution

B A more reactive halogen displaces a less reactive halide from solution

C Only fluorine can displace other halogens

D Displacement depends only on the concentration of the halide, not reactivity

E Noble gases are the main displacing agents

41 **Iodine is added to a solution of potassium bromide (KBr). What happens?**

A Iodine displaces bromine, forming Br2

B Bromine displaces iodine, forming I2

C No displacement reaction occurs

D Potassium metal forms

E A precipitate of KBr forms because it is insoluble

42 **Group 1 metals are typically softer and have lower melting points than Group 2 metals. The best explanation is that Group 1 metals usually have:**

A More delocalized electrons per atom, creating stronger metallic bonding

B Fewer delocalized electrons per atom and lower charge density, creating weaker metallic bonding

C Covalent bonds instead of metallic bonds

D No electrons in the outer shell

E Only ionic bonds inside the metal

43 **Which statement best explains why Group 2 metals generally have higher melting points than Group 1 metals?**

A Group 2 metals are nonmetals, so they melt at higher temperatures

B Group 2 metals form larger atoms, so they always melt higher

C Group 2 metals provide more delocalized electrons and form 2+ ions, strengthening metallic bonding

D Group 2 metals have fewer electrons, so they melt higher

E Melting point depends only on atomic number, not bonding

44 **Down Group 17 (F2 → Cl2 → Br2 → I2), boiling points generally increase mainly because:**

A The covalent bond inside each molecule becomes much stronger

B The molecules get larger, increasing London (dispersion) forces between molecules

C Halogens become ionic down the group

D Halogens gain fewer electrons down the group

E The number of protons decreases down the group

45 **Down Group 1 (Li → Na → K → Rb → Cs), melting points generally decrease mainly because:**

A The metallic bonding becomes weaker as atoms get larger and the attraction between ions and delocalized electrons decreases

B They become nonmetals down the group

C They start forming covalent bonds instead of metallic bonds

D They gain electrons more easily down the group

E Their valence electron number changes from 1 to 2 down the group

#	Ans	Answer Text
	D	
2	A	Li, Na, K
	D	
4	B	2+
	B	
6	B	Moisture (water) in the air
	B	
8	B	Metal hydroxide + hydrogen gas
	C	
10	B	Because sodium hydroxide forms, producing OH− ions in solution
	B	
12	D	Ba
	B	
14	B	MgO and H2
	B	
16	B	Decreases
	C	
18	C	Bromine
	B	
20	B	I2
	C	
22	B	Have a full outer electron shell
	D	
24	B	A more reactive metal displaces a less reactive metal from its salt solu…
	D	
26	C	A reddish-brown solid (copper) forms on the zinc, and the blue color fad…
	B	
28	C	Hydrogen (H2)
	C	
30	B	Iron (Fe) is more reactive than copper (Cu)
	D	
32	B	It is more reactive than hydrogen
	C	
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36	D	Iron (Fe)
	B	
38		Zinc is more reactive than iron and will oxidize first (sacrificial prot…