

SCI 10 Review Booklet

Name:

Review of Atomic Structure

Draw the energy level diagrams and Bohr models for each of the following elements and answer the two questions at the bottom of the page.

1. hydrogen atom

6. aluminum atom

2. carbon atom

7. phosphorus atom

3. helium atom

8. chlorine atom

4. oxygen atom

9. argon atom

5. sodium atom

10. calcium atom

11. What is the relationship between group number and number of valence (outermost) electrons?

12. What is the relationship between period number and the number of energy levels occupied by electrons?

Review of Ionic Structure

Draw the energy level diagrams and Bohr models for each of the following ions and answer the two questions at the bottom of the page.

1. lithium ion

6. nitride ion

2. fluoride ion

7. sodium ion

3. aluminum ion

8. sulphide ion

4. chloride ion

9. calcium ion

5. magnesium ion

10. oxide ion

11. What is the relationship between the electron configuration of an ion of one of the representative elements and the electron configuration of the nearest noble gas?

12. What problem arises when trying to predict the charge on an ion in Group 14?

Review of Atoms vs. Ions

Complete the following chart:

Name	Symbol	# of Protons	# of Electrons	Net Charge
eg. calcium ion	Ca ²⁺	20	18	2+
1. oxygen atom				
2. fluoride ion				
3.	C			
4.	Cl ⁻			
5.		12		2+
6.		16		2-
7.			18	1+
8.			10	0
9.	Ba ²⁺			
10. helium atom				
11.	H ⁺			
12.		7	10	
13.	Fe ³⁺			
14.	Sn ⁴⁺			
15. sodium ion				
16.	Al ³⁺			
17.		29		2+
18.			54	1-
19. gold atom				
20.			54	1+

Review of Elements and Ionic Nomenclature

Formula		IUPAC Name
1.	$\text{CdO}_{(s)}$	
2.		sodium fluoride
3.		chlorine gas
4.	AlP	
5.		copper (II) oxide
6.	$\text{Mg}(\text{OH})_{2(s)}$	
7.	Na_2CO_3	
8.		magnesium sulphate
9.	$\text{N}_{2(g)}$	
10.		lithium chloride
11.		sodium chlorate
12.	$\text{K}_3\text{PO}_{4(s)}$	
13.		calcium metal
14.		nickel (III) bromide
15.	$\text{MnO}_{2(s)}$	
16.		ammonium sulphite
17.		zinc sulphide
18.	$\text{NaHSO}_{3(s)}$	
19.		ammonium sulphate
20.	$\text{Au}_{(s)}$	
21.		copper (II) chloride
22.	$\text{SnF}_{2(s)}$	
23.		phosphorus
24.		sodium hypochlorite
25.	$\text{KMnO}_{4(s)}$	

Review of Ionic Nomenclature

Formula		IUPAC Name
26.	$\text{SrF}_{2(s)}$	
27.	$\text{RbCl}_{(s)}$	
28.	$\text{Li}_2\text{O}_{(s)}$	
29.		iron (III) sulphide
30.		zinc chloride
31.		aluminum sulphide
32.	$\text{CoCl}_{2(s)}$	
33.	$\text{Au}(\text{NO}_3)_{3(s)}$	
34.	$\text{Cu}_2\text{O}_{(s)}$	
35.		lead (IV) acetate
36.		chromium (II) oxide
37.		magnesium iodide
38.	$\text{KC}_6\text{H}_5\text{COO}_{(s)}$	
39.	$\text{Na}_2\text{S}_2\text{O}_3(s)$	
40.	$\text{NH}_4\text{HCO}_3(s)$	
41.		ammonium sulphide
42.		barium sulphite
43.		magnesium hydroxide
44.	FeSO_4	
45.	LiCl	
46.		sodium phosphate
47.	$\text{TiO}_{2(s)}$	
48.		bismuth (V) sulphate
49.		tin (IV) sulphide
50.	$\text{NaOH}_{(s)}$	

Review of Molecular Nomenclature and Acids

Formula		IUPAC Name
1.	$\text{NO}_3(\text{g})$	
2.		ammonia
3.	$\text{H}_2\text{S}(\text{g})$	
4.		oxygen difluoride
5.		methane
6.	$\text{CH}_3\text{OH}(\text{l})$	
7.	$\text{HBr}(\text{aq})$	
8.		sulphurous acid
9.	$\text{CS}_2(\text{l})$	
10.		hydrosulphuric acid
11.	$\text{SO}_2(\text{g})$	
12.		dinitrogen tetroxide
13.	$\text{HNO}_2(\text{aq})$	
14.		carbon monoxide
15.	$\text{C}_{12}\text{H}_{22}\text{O}_{11}(\text{s})$	
16.		hypochlorous acid
17.		diarsenic trioxide
18.		ethanol
19.	$\text{H}_2\text{CO}_3(\text{aq})$	
20.		perchloric acid
21.	$\text{P}_4\text{O}_{10}(\text{s})$	
22.		sulphur trioxide
23.	$\text{CF}_4(\text{l})$	
24.		silicon dioxide
25.	$\text{CH}_3\text{COOH}(\text{aq})$	

Review of Nomenclature

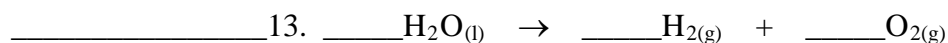
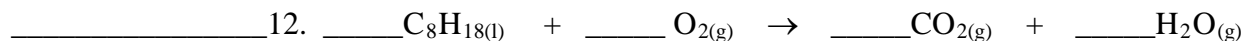
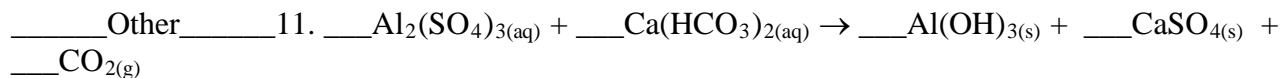
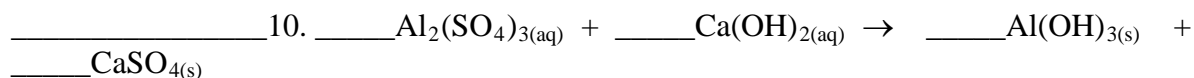
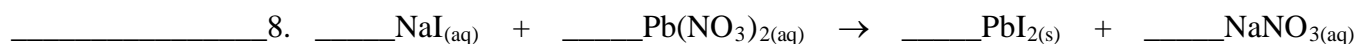
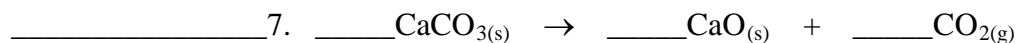
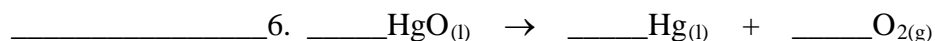
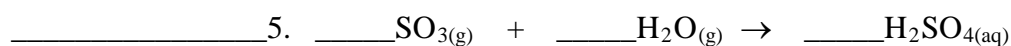
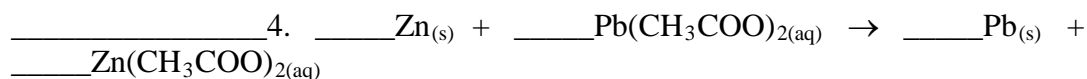
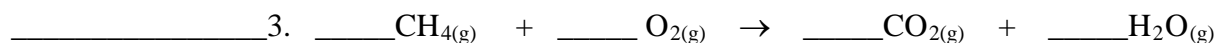
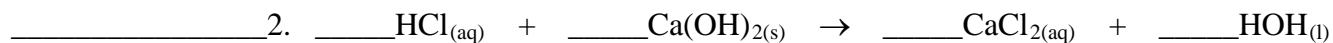
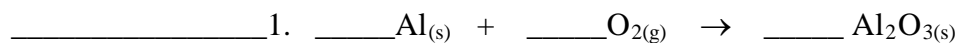
	Class	Formula	IUPAC Name
1.		$\text{H}_3\text{PO}_4(\text{aq})$	
2.			chlorous acid
3.			magnesium
4.		$\text{Al}_2(\text{SO}_4)_3(\text{s})$	
5.			magnesium chloride
6.		$\text{NH}_4\text{NO}_2(\text{s})$	
7.			phosphorus trihydride
8.		$\text{KNO}_3(\text{s})$	
9.			sodium nitrate
10.		$\text{HNO}_2(\text{aq})$	
11.		$\text{Al}(\text{OH})_3(\text{s})$	
12.			sodium sulphate
13.		$(\text{NH}_4)_2\text{SO}_4(\text{s})$	
14.		$\text{PbF}_4(\text{s})$	
15.			hydrogen peroxide
16.		$\text{PbO}(\text{s})$	
17.			hydrofluoric acid
18.		$\text{KClO}(\text{s})$	
19.			bromine
20.		$\text{N}_2\text{O}_3(\text{g})$	
21.		K_2CO_3	
22.			nitric acid
23.		$\text{HF}(\text{g})$	
24.			sodium hydroxide
25.		$\text{NaHSO}_3(\text{s})$	

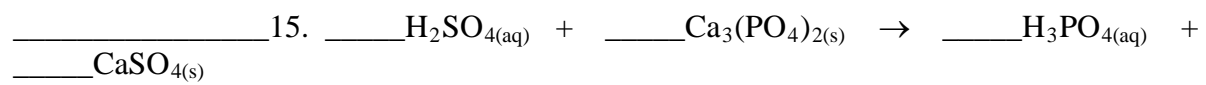
Review of Nomenclature

	Class	Formula	IUPAC Name
26.			magnesium sulphate
27.		$\text{Ca(OH)}_{2(s)}$	
28.			gold (I) chloride
29.		$\text{CaO}_{(s)}$	
30.			copper (II) sulphate
31.			sulphur
32.		$\text{Ca(HCO}_3)_2(s)$	
33.		$\text{KBr}_{(s)}$	
34.			titanium (IV) oxide
35.		$\text{PCl}_{5(g)}$	
36.			sodium chlorate
37.		$\text{N}_2\text{H}_{4(l)}$	
38.			hydrogen chloride
39.			chloric acid
40.			lithium thiosulphate
41.		$\text{B}_2\text{H}_{6(g)}$	
42.			nitrogen trichloride
43.			sodium hydrogen sulphite
44.		$\text{Al}_{(s)}$	
45.		$\text{HBr}_{(aq)}$	
46.			silicon
47.			ammonium phosphate
48.			xenon
49.		$\text{SF}_{2(s)}$	
50.		$\text{Na}_2\text{SiO}_{3(s)}$	

Review of Chemical Reactions

For each of the following reactions, identify the reaction type and balance the reaction.





Review of Chemical Reactions

For each of the following word equations, write out the balanced chemical reaction including all states and identify the reaction type.

_____ 1. water → hydrogen + oxygen

_____ 2. nitrogen + hydrogen → ammonia gas

_____ 3. sulphuric acid + sodium hydroxide → water + sodium sulphate

_____ 4. aluminum + copper (II) nitrate → copper + aluminum nitrate

_____ 5. chlorine + potassium bromide → bromine + potassium chloride

_____ 6. sodium hydroxide + aluminum sulphate → aluminum hydroxide + sodium sulphate

_____ 7. phosphorus + oxygen → solid tetraphosphorus decaoxide

_____ 8. lead (II) nitrate + sodium iodide → lead (II) iodide + sodium nitrate

_____ 9. methanol + oxygen → carbon dioxide + water vapour

___Other_____ 10. nitrogen dioxide gas + water → nitric acid + nitrogen monoxide gas

Review of Predicting Chemical Reactions

For each of the following reactions:

1. Write the correct equation including states for each element and compound.
 2. Balance the equation.
 3. State the reaction type.
1. Nitrogen triiodide decomposes explosively into its elements.
 2. Gallium metal reacts with hydrochloric acid.
 3. In a charcoal barbeque, some of the carbon undergoes incomplete combustion to produce deadly carbon monoxide gas.
 4. Solutions of calcium nitrate and potassium phosphate are mixed.
 5. Chlorine gas is bubbled through an aluminum iodide solution.
 6. Iron reacts with silver nitrate. The iron (III) compound is formed.
 7. Acetylene ($C_2H_{2(g)}$) burns in a welding torch.
 8. Copper ore (copper (II) oxide) is decomposed to produce copper metal.
 9. Titanium (IV) chloride solution reacts with a sodium phosphate solution.
 10. Sulphuric acid is neutralized by sodium hydroxide.

Review of Significant Digits, Scientific Notation and SI Units

State the number of significant digits in each of the following measured values:

- | | | | |
|-------------------------|-------|----------------------------|-------|
| 1. 18.56 g | _____ | 4. 1.00 W | _____ |
| 2. 1500°C | _____ | 5. 0.05730 mol | _____ |
| 3. 0.0062 L | _____ | 6. 8.0×10^{-2} mL | _____ |
| 7. 14.08 cm | _____ | 9. 0.100 km | _____ |
| 8. 1.58×10^8 m | _____ | 10. 62 km/h | _____ |

Convert the following numbers into scientific notation. The number in brackets indicates the number of significant digits the answer is to be rounded to.

- | | | | |
|-----------|-----------|---------------|-----------|
| 1. 1000 | _____ (1) | 4. 0.00001098 | _____ (3) |
| 2. 492.32 | _____ (3) | 5. 6 995 000 | _____ (3) |
| 3. 0.0573 | _____ (2) | 6. 62.49 | _____ (2) |

Using the SI Prefixes table on your data sheet, perform the following conversions. Maintain the same number of significant digits in each conversion.

- | | |
|-----------------------|--------------------------|
| 1. 0.520 km = _____ m | 6. 200 mL = _____ L |
| 2. 100 mL = _____ L | 7. 45 g = _____ kg |
| 3. 152.5 cm = _____ m | 8. 10.8 mol = _____ mmol |
| 4. 3300 mg = _____ g | 9. 0.450 L = _____ mL |
| 5. 650 kg = _____ g | 10. 1500 m = _____ km |

Perform the following calculations. Round your answer to the correct number of significant digits, using scientific notation where necessary. Include units.

- 16.56 mL – 6.3 mL = _____
- 21.4 g ÷ 0.825 mol = _____
- 480 km + 24.07 km = _____
- 0.550 mol × 40.00 g/mol = _____
- 18.4 g/mL × 5.5 mL = _____
- 22.99 g/mol + 35.45 g/mol = _____
- 18.5°C – 4.5°C = _____
- 6.0 g ÷ 24.30 g/mol = _____
- 19.55 mL – 17.55 mL = _____
- 15 600 g ÷ 2000 mol = _____

Review of Molar Mass and Mole Calculations

Complete the following chart, showing all calculations, formulas, substitutions, units and significant digits.

Name and Formula	Molar Mass	Mass	Moles
1. NaCl _(s)			0.20 mol
2. sodium hydroxide		5.48 g	
3. (NH ₄) ₃ PO _{4(s)}			0.600 mol
4. sodium carbonate octahydrate		50 g	

Name and Formula	Molar Mass	Mass	Moles
5. Ca(NO ₃) _{2(s)}		8.45 g	
6. potassium dichromate		5.65 g	
7. Na ₂ CO _{3(s)}			0.850 mol
8. sulphur trioxide			1.45 mol

Science 10 Review

- Define the following terms:
 - proton
 - neutron
 - electron
 - atom
 - ion
 - valence electron
 - octet rule
 - monovalent
 - multivalent
 - endothermic
 - exothermic
 - law of conservation of matter
 - mole
 - molar mass
- Draw the energy level diagrams for the following:
 - fluorine atom
 - carbon atom
 - lithium ion
 - nitride ion
 - argon atom
 - magnesium ion
- Where on the periodic table would you find nonmetals? What kind of charge do all nonmetals have?
- Where on the periodic table would you find metals? What kind of charge do all metals have?
- Perform the following unit conversions:
 - 500 kg = _____ g
 - 25.5 mL = _____ L
 - 102.6 mmol = _____ mol
 - 58.2 MJ = _____ J
 - 600 mg = _____ g
 - 9.85 GL = _____ L
 - 6.85 cm = _____ m
 - 680 nm = _____ m
- Calculate the number of moles in 6.55 g of $\text{NaHCO}_3(\text{s})$.
- Calculate the mass of 8.98 mol of $\text{AgNO}_3(\text{s})$.
- What is the mass of 0.155 mol of potassium phosphate?
- How many moles are in 0.558 kg of dinitrogen dioxide?

10. Complete the following chart:

	Class	Formula	IUPAC Name
1.		SrCl_2	
2.		$\text{H}_2\text{S}_{(\text{aq})}$	
3.		Na_2O	
4.		H_2O	
5.		$\text{CaS}_2\text{O}_3 \cdot 7\text{H}_2\text{O}$	
6.		$\text{Fe}(\text{IO}_3)_3$	
7.		P_2O_4	
8.		$\text{S}_{8(\text{s})}$	
9.		$\text{Ni}(\text{OH})_2$	
10.		$\text{H}_3\text{PO}_{4(\text{aq})}$	
11.		NaCl	
12.		$\text{N}_{2(\text{g})}$	
13.		$\text{Sb}_2(\text{SO}_3)_5$	
14.		$\text{Ca}_{(\text{s})}$	
15.			sodium chloride
16.			copper (II) sulphate pentahydrate
17.			ammonium sulphide
18.			bismuth (III) sulphate
19.			sodium sulphate decahydrate
20.			water
21.			copper (I) oxide
22.			calcium
23.			hydroiodic acid
24.			radon gas
25.			ethanol
26.			sucrose
27.			nitrogen gas
28.			carbonic acid
29.			dinitrogen monoxide
30.			nitrous acid

11. After the chemical formula for each compound, state the solubility with either **(aq)** for soluble or **(s)** for low solubility in water.

- | | |
|------------------------|------------------------|
| 1. K_2S () | 11. $Zn_3(PO_4)_2$ () |
| 2. NH_4CH_3COO () | 12. PbI_2 () |
| 3. $Fe(OH)_3$ () | 13. $ZnSO_4$ () |
| 4. $HgBr$ () | 14. $Cu(NO_3)_2$ () |
| 5. $BaSO_4$ () | 15. $AgCl$ () |
| 6. $CaCl_2$ () | 16. $CdSO_4$ () |
| 7. CuI_2 () | 17. NH_4Cl () |
| 8. $Ca(CH_3COO)_2$ () | 18. CuS () |
| 9. $FeSO_4$ () | 19. $PbCl_2$ () |
| 10. $Co(NO_3)_2$ () | 20. Na_3PO_4 () |

12. Balance the following reactions and give the reaction type:

- a) $\underline{\hspace{1cm}} Al_2S_{3(s)} \rightarrow \underline{\hspace{1cm}} Al_{(s)} + \underline{\hspace{1cm}} S_{8(s)}$
- b) $\underline{\hspace{1cm}} N_{2(g)} + \underline{\hspace{1cm}} O_{2(g)} \rightarrow \underline{\hspace{1cm}} NO_{2(g)}$
- c) $\underline{\hspace{1cm}} Na_{(s)} + \underline{\hspace{1cm}} Pb(CH_3COO)_{2(aq)} \rightarrow \underline{\hspace{1cm}} Pb_{(s)} + \underline{\hspace{1cm}} NaCH_3COO_{(aq)}$
- d) $\underline{\hspace{1cm}} Ba_{(s)} + \underline{\hspace{1cm}} HOH_{(l)} \rightarrow \underline{\hspace{1cm}} H_{2(g)} + \underline{\hspace{1cm}} Ba(OH)_{2(aq)}$
- e) $\underline{\hspace{1cm}} CH_{4(g)} + \underline{\hspace{1cm}} O_{2(g)} \rightarrow \underline{\hspace{1cm}} CO_{2(g)} + \underline{\hspace{1cm}} H_2O_{(g)}$
- f) $\underline{\hspace{1cm}} CaSO_{4(s)} + \underline{\hspace{1cm}} AgNO_{3(aq)} \rightarrow \underline{\hspace{1cm}} Ag_2SO_{4(s)} + \underline{\hspace{1cm}} Ca(NO_3)_{2(aq)}$
- g) $\underline{\hspace{1cm}} CH_3OH_{(l)} + \underline{\hspace{1cm}} O_{2(g)} \rightarrow \underline{\hspace{1cm}} CO_{2(g)} + \underline{\hspace{1cm}} H_2O_{(g)}$
- h) $\underline{\hspace{1cm}} Na_2SO_{4(aq)} + \underline{\hspace{1cm}} FeCl_{3(aq)} \rightarrow \underline{\hspace{1cm}} NaCl_{(aq)} + \underline{\hspace{1cm}} Fe_2(SO_4)_{3(aq)}$
- i) $\underline{\hspace{1cm}} Cr_2O_{3(s)} \rightarrow \underline{\hspace{1cm}} Cr_{(s)} + \underline{\hspace{1cm}} O_{2(g)}$
- j) $\underline{\hspace{1cm}} V_{(s)} + \underline{\hspace{1cm}} S_{8(g)} \rightarrow \underline{\hspace{1cm}} V_2S_{5(s)}$

13. For each of the following word problems, **give the reaction type and write out a balanced chemical reaction** including **all states of matter**.

a) Nitrogen triiodide decomposes explosively into its elements.

b) In a charcoal barbeque, some of the carbon undergoes incomplete combustion to produce deadly carbon monoxide gas.

c) Solutions of calcium nitrate and potassium phosphate are mixed.

d) The main fuel used to propel rockets into outer space is liquid hydrogen combining with liquid oxygen to produce water vapour.

e) Chlorine gas is bubbled through an aluminum iodide solution.