

Science 10

PROVINCIAL EXAM

STUDY BOOKLET

Unit 3

Student Instructions

1. Ensure that you have **blank paper** and a **Data Booklet**.
2. Record all answers on a separate piece of paper.
3. Answer keys are provided at the beginning of each section.
4. When you have finished with this **StudyBooklet** please return it to your teacher.

NOTE: THIS STUDY BOOKLET CONTAINS QUESTIONS FROM THE 2004:

- SC10 SAMPLE QUESTIONS - SC10 SAMPLE EXAM - SC10 RELEASED EXAM

- SC10 2005 RELEASED EXAM

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UNIT 3 CHEMISTRY

KEY: 31. B 32. A 33. C 34. A 35. B 36. F 37. F 38. A 39. D 40. C 41. B 42. C 43. B □
44. C 45. D 46. D 47. C 48. B 49. A 50. B

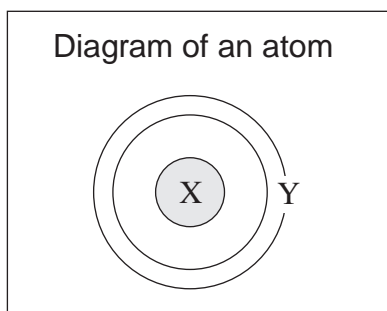
RECORD YOUR ANSWERS ON A SEPARATE PIECE OF PAPER

D. PHYSICAL SCIENCE <i>(Chemical and Reactions)</i>	10D2 – describe the arrangement of subatomic particles (electrons, protons, neutrons) in elements <ul style="list-style-type: none"> Bohr Model of elements 1 to 20
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Knowledge

Prescribed Learning Outcomes – 10D2

Use the following diagram to answer question 31.



31. Which of the following is correct?

	Subatomic Particle	Location in the Atom	Charge of the Particle
A.	Proton	X	negative
B.	Electron	Y	negative
C.	Neutron	Y	no charge
D.	Proton	X	no charge

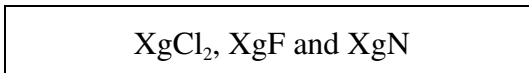
Use the following information to answer question 32.

45	?	? represents the symbol of the element
21		

32. Which of the following is the name and sub-atomic particle arrangement for a neutral atom of the element?

	Element	Sub-Atomic Particles
A.	Scandium	24 neutrons, 21 electrons
B.	Scandium	21 neutrons, 24 protons
C.	Rhodium	45 protons, 24 neutrons
D.	Rhodium	45 protons, 45 electrons

33. A new element Xg has been recently discovered. It forms compounds with the following formulæ:



What are the likely ion charges for Xg?

- A. +2, -2
 B. +1, +2
 C. +1, +2, +3
 D. +1, +2, +3, -1, -2, -3

D. PHYSICAL SCIENCE <i>(Chemical and Reactions)</i>	10D3 – distinguish among atoms, isotopes, and ions
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Knowledge

Prescribed Learning Outcomes – 10D3

**REFER TO
DATA BOOKLET**

**Use The Periodic Table on page 3 of the Data Booklet
to answer question 34.**

34. Which of the following is a common characteristic of the outermost shell of an alkali metal atom?
- A. 1 electron
 - B. 2 electrons
 - C. 7 electrons
 - D. 8 electrons

**REFER TO
DATA BOOKLET**

Use The Periodic Table on page 3 of the Data Booklet
to answer questions 35 to 39.

Chlorine-35

For the above isotope, match each Term on the left with
the correct Number on the right. Each Number may be used as often as necessary.
Record your answers on the Response Form.

Term	Number
35. atomic number	A. -1
36. number of neutrons	B. 17
37. number of electrons in the most common ion	C. 16
38. ion charge	D. 3
39. number of shells occupied by electrons for the atom	E. 35
	F. 18

Answers

35. (A) (B) (C) (D) (E) (F)

38. (A) (B) (C) (D) (E) (F)

36. (A) (B) (C) (D) (E) (F)

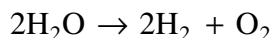
39. (A) (B) (C) (D) (E) (F)

37. (A) (B) (C) (D) (E) (F)

40. The atomic mass of tellurium is greater than that of iodine. Which of the following best explains this?
- A. Iodine has one less proton than tellurium.
 - B. Tellurium has one less proton than iodine.
 - C. The naturally occurring isotopes of iodine have fewer neutrons than those of tellurium.
 - D. The naturally occurring isotopes of tellurium have fewer neutrons than those of iodine.

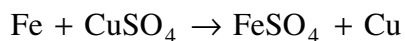
D. PHYSICAL SCIENCE <i>(Chemical and Reactions)</i>	10D5 – demonstrate a knowledge of chemical formulæ and balanced chemical equations <ul style="list-style-type: none">• including ionic and covalent compounds• including writing names, formulæ, and balanced equations
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Use the following equation to answer question 41.



41. In this equation, O_2 represents 2 molecules of oxygen.
- A. True
 - B. False

Use the following equation to answer question 42.



42. Which statement is supported by the equation above?
- A. Iron gains electrons.
 - B. Copper loses electrons.
 - C. Copper gains electrons.
 - D. Copper and iron gain electrons.

Use the following information to answer question 43.

Compound I	Compound II
copper (II) nitrate	aluminum nitrite

43. Which of the following statements is correct?
- The number of atoms in aluminum nitrite is less.
 - The number of atoms in copper (II) nitrate is less.
 - The number of atoms is equal in both compounds.
 - The relationship cannot be determined from the information given.

**D. PHYSICAL
SCIENCE**

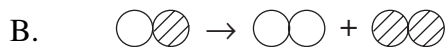
*(Chemical and
Reactions)*

10D6 – give evidence for and classify the following chemical reactions:
synthesis, decomposition, replacement, and acid-base

- single and double replacement
- neutralization

44. Which of the following is a single replacement reaction?
- $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
 - $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$
 - $\text{Mg} + 2\text{HCl} \rightarrow \text{MgCl}_2 + \text{H}_2$
 - $\text{AgNO}_3 + \text{KCl} \rightarrow \text{AgCl} + \text{KNO}_3$

45. Which of the following diagrams best illustrates the concept of a double replacement reaction?



Match each Chemical Reaction on the left with the correct Reaction Type on the right.
Each Reaction Type may be used as often as necessary.
Record your answers on the Response Form.

Chemical Reaction	Reaction Type
46. $\text{Ca(OH)}_2 + 2\text{HCl} \rightarrow \text{CaCl}_2 + 2\text{H}_2\text{O}$	A. synthesis
47. $2\text{AgNO}_3 + \text{Cu} \rightarrow 2\text{Ag} + \text{Cu(NO}_3)_2$	B. decomposition
48. $2\text{H}_2\text{O}_2 \rightarrow 2\text{H}_2\text{O} + \text{O}_2$	C. single replacement
49. $8\text{Ni} + \text{S}_8 \rightarrow 8\text{NiS}$	D. neutralization

Answers

46. (A) (B) (C) (D) (E) (F)
 47. (A) (B) (C) (D) (E) (F)
 48. (A) (B) (C) (D) (E) (F)
 49. (A) (B) (C) (D) (E) (F)

Higher Mental Processes**Prescribed Learning Outcomes – 10D6**

50. Scrap iron metal can be used to inexpensively obtain copper metal from waste copper sulphate solution.

Which reaction type best describes this procedure?

- A. synthesis
 B. replacement
 C. neutralization
 D. decomposition

ANSWER KEY: 27. D 28. A 29. A 30. B 31. D 32. B 33. B 34. C 35. C 36. A
37. D 38. C 39. D 40. B 41. C 42. D 43. C 44. A 45. A 46. B 47. D 48. B

RECORD ANSWERS ON A SEPARATE SHEET OF PAPER

PHYSICAL SCIENCE

Chemicals and Reactions

REFER TO
DATA BOOKLET

For this section of the examination, refer to:

- Names, Formulae and Charges of Some Common Ions on page 1
- Alphabetical Listing of the Elements on page 2
- The Periodic Table on page 3

27. Which of the following best describes the properties of an electron?

	Relative Mass	Location
A.	large	in the nucleus
B.	large	orbiting the nucleus
C.	small	in the nucleus
D.	small	orbiting the nucleus

28. Which of the following statements about Li^{+1} are true?

- A. I and III
B. I and IV
C. II and III
D. II and IV

I	Li^{+1} is a symbol for a lithium ion.
II	Li^{+1} is a symbol for a lithium atom.
III	Li^{+1} has lost one electron.
IV	Li^{+1} has gained one electron.

29. Cl_2 is an example of a diatomic molecule.

- A. True
- B. False

30. OH^{-1} is an example of an ionic compound.

- A. True
- B. False

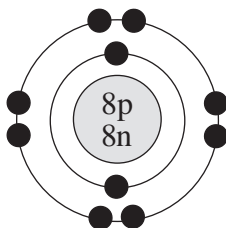
31. Which of the following represents the Bohr model electron arrangement of an argon atom?

- A. 2, 16
- B. 2, 18
- C. 2, 8, 6
- D. 2, 8, 8

32. Noble Gases react easily with other elements.

- A. True
- B. False

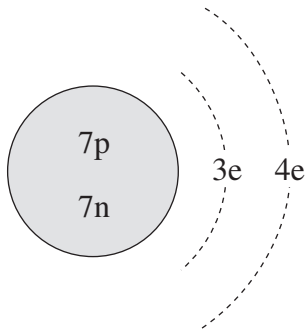
33. Which of the following is represented by the Bohr model below?



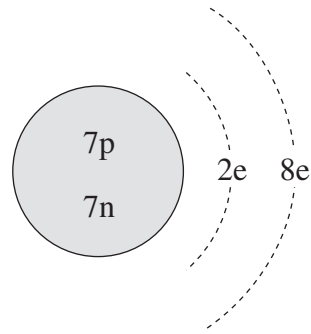
- A. an atom of neon
- B. an ion of oxygen
- C. a molecule of oxygen
- D. a neutral atom of oxygen

34. Which of the following is the Bohr model for a nitrogen atom?

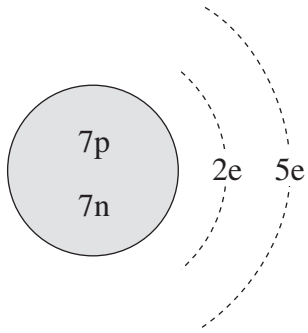
A.



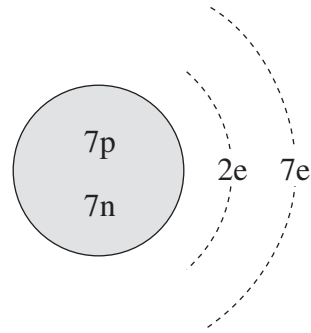
B.



C.



D.



35. Covalent bonding involves the _____ of electrons, while ionic bonding involves the _____ of electrons.

- A. sharing; splitting
- B. exchanging; sharing
- C. sharing; transferring
- D. transferring; sharing

Use the information below to answer question 36.

$\begin{matrix} 23 \\ ? \\ 11 \end{matrix}$	$? \text{ represents the symbol of the element}$
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36. Which of the following describes a neutral atom of the element?

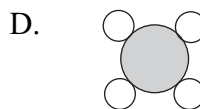
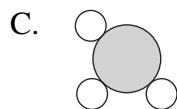
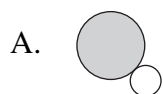
	Element	Sub-atomic particles
A.	Sodium	11 electrons, 12 neutrons
B.	Sodium	23 neutrons, 11 protons
C.	Vanadium	12 neutrons, 23 protons
D.	Vanadium	11 electrons, 11 protons

37. What is the formula for calcium hydroxide?

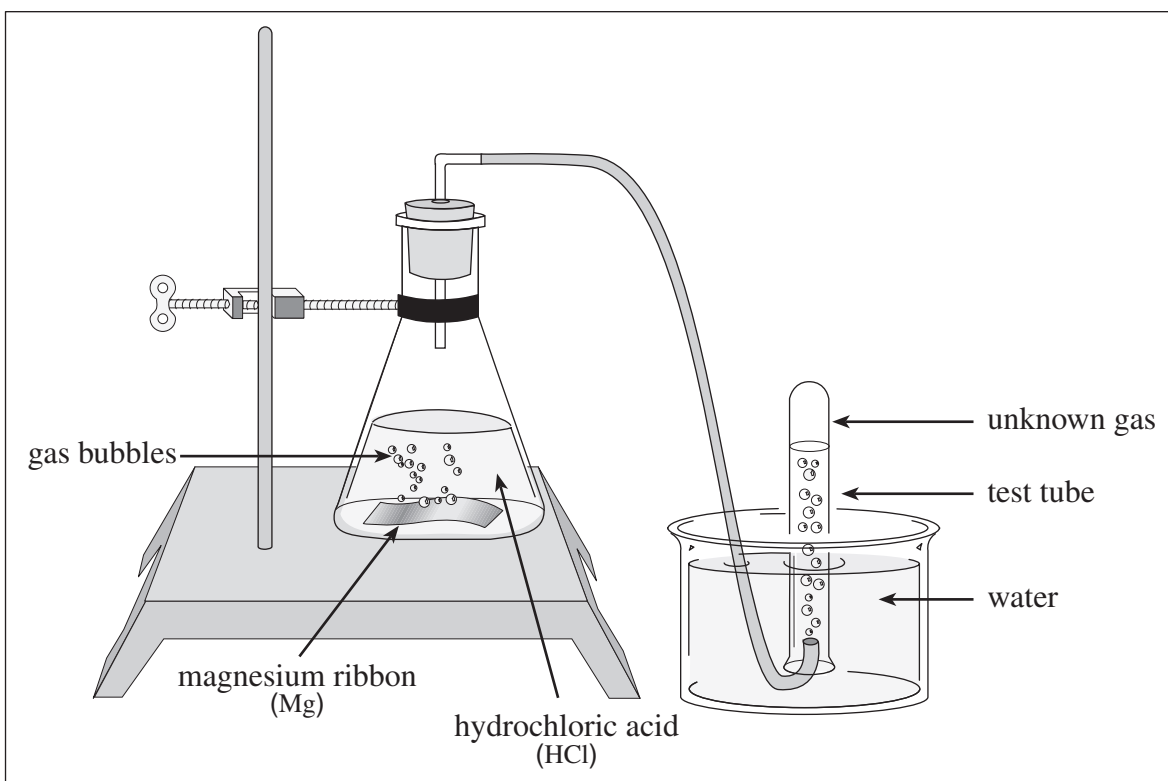
- A. CaOH
- B. CaOH₂
- C. Ca₂OH
- D. Ca(OH)₂

38. Which of the following represents the molecule formed when hydrogen reacts with nitrogen?

 hydrogen	 nitrogen
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Use the following illustration of a chemical reaction to answer questions 39 and 40.



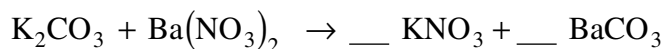
39. What are the reactants in the demonstration above?

- A. Mg and O₂
- B. Mg and H₂
- C. Mg and H₂O
- D. Mg and HCl

40. What gas is collected in the test tube?

- A. O₂
- B. H₂
- C. Cl₂
- D. MgH₂

41. Which of the following correctly balances the equation?



- A. $\text{KNO}_3 + \text{BaCO}_3$
- B. $\text{KNO}_3 + 2\text{BaCO}_3$
- C. $2\text{KNO}_3 + \text{BaCO}_3$
- D. $2\text{KNO}_3 + 2\text{BaCO}_3$

Match each Chemical Reaction on the left with the correct Reaction Type on the right. Each Reaction Type may be used as often as necessary. Record your answers on the Answer Sheet.

Chemical Reaction	Reaction Type
42. $2\text{KI} + \text{Pb}(\text{NO}_3)_2 \rightarrow \text{PbI}_2 + 2\text{KNO}_3$	A. synthesis
43. $\text{Mg} + 2\text{HCl} \rightarrow \text{H}_2 + \text{MgCl}_2$	B. decomposition
44. $2\text{K} + \text{Cl}_2 \rightarrow 2\text{KCl}$	C. single replacement
	D. double replacement
	E. neutralization (acid/base)

45. Which of the following equations are balanced?

I	$2\text{KCl} + \text{Ca}(\text{NO}_3)_2 \rightarrow 2\text{KNO}_3 + \text{CaCl}_2$
II	$\text{FeCl}_3 + 3\text{KOH} \rightarrow \text{Fe}(\text{OH})_3 + 3\text{KCl}$
III	$2\text{Na} + \text{H}_2\text{SO}_4 \rightarrow \text{Na}_2\text{SO}_4 + 2\text{H}_2$

- A. I and II
- B. I and III
- C. II and III
- D. I, II and III

46. Solid copper wire, Cu, is placed in a colourless, silver nitrate solution, AgNO₃. After 15 minutes, the solution has turned blue and silver crystals have formed. A reference text states that when dissolved in water:

- Cu⁺² ions are blue.
- Ag⁺ ions are colourless.
- NO₃⁻ ions are colourless.

Which of the following is the best conclusion?

- A. The silver atoms have lost electrons forming ions.
- B. The copper atoms have lost electrons forming ions.
- C. The silver atoms have gained electrons forming ions.
- D. The copper atoms have gained electrons forming ions.

47. Which of the following is the symbol for boron with a mass number of 11?

- A. ${}_{11}^3\text{B}$
- B. ${}_{11}^5\text{B}$
- C. ${}_{3}^{11}\text{B}$
- D. ${}_{5}^{11}\text{B}$

48. Which of the following explains the difference between the atoms of Cobalt-60 and Cobalt-58?

- A. Cobalt-60 has 2 fewer protons.
- B. Cobalt-60 has 2 more neutrons.
- C. Cobalt-60 has 2 more electrons.
- D. Cobalt-58 and 60 have the same number of neutrons.

INSTRUCTIONS: For each question, select the **best** answer and record your choice on a separate piece of paper.

ANSWER KEY: 29. A 30. A 31. A 32. B 33. B 34. A 35. A 36. D 37. B
38. A 39. B 40. A 41. D 42. D 43. C 44. A 45. C 46. D 47. D 48. D
49. B 50. A 51. E 52. C

PHYSICAL SCIENCE**Chemicals and Reactions****REFER TO
DATA BOOKLET**

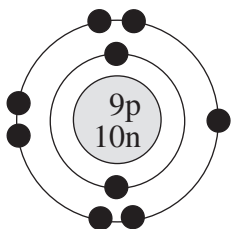
For this section of the examination, refer to:

- Names, Formulæ and Charges of Some Common Ions on page 1
- the Alphabetical Listing of the Elements on page 2
- the Periodic Table of the Elements on page 3

29. Which atom has 28 protons?

- A. nickel
- B. silicon
- C. fluorine
- D. chromium

30. Consider the following diagram.



This element has a mass number of 19.

- A. True
- B. False

31. Which atom will produce an ion with 33 protons, 42 neutrons and 36 electrons?

- A. arsenic
- B. krypton
- C. rhenium
- D. molybdenum

32. Which neutral atom has 6 neutrons and 6 electrons?

- A. boron
- B. carbon
- C. helium
- D. magnesium

Use the following information to answer question 33.

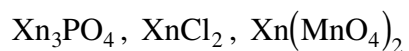
9 ? 4	? represents the symbol of the element
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33. Which of the following describes a neutral atom of the element?

	Element	Sub-Atomic Particles
A.	Beryllium	9 electrons, 4 protons
B.	Beryllium	4 electrons, 5 neutrons
C.	Fluorine	4 electrons, 4 protons
D.	Fluorine	9 neutrons, 9 protons

Use the following information to answer question 34.

A new element Xn has recently been discovered. It forms compounds with the following formulae:



34. Xn has more than one ion charge (combining capacity).

- A. This statement is supported by the information.
- B. This statement is refuted by the information.
- C. This statement is neither supported nor refuted by the information.

35. A neutral atom has the same number of protons as electrons.

- A. True
- B. False

36. How many electrons are in the outer shell of an argon atom?

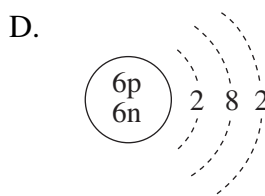
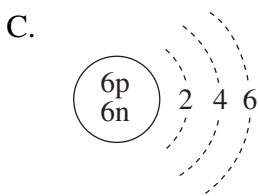
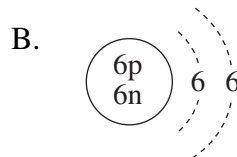
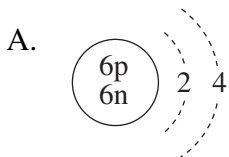
- A. 1
- B. 2
- C. 7
- D. 8

37. Which of the following statements about Cl^{-1} are true?

I	It symbolizes an ion.
II	It symbolizes an atom.
III	Chlorine has lost one electron.
IV	Chlorine has gained one electron.

- A. I and III only
- B. I and IV only
- C. II and III only
- D. II and IV only

38. Which of the following represents the Bohr model for a carbon atom?



39. The formula S_8 represents a diatomic molecule.

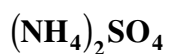
- A. True
- B. False

40. The formula ClO_3^{-1} represents an ion.

- A. True
- B. False

41. Which of the following is the formula for the compound formed by potassium and phosphorus?

- A. KP
- B. K_2P
- C. KP_3
- D. K_3P



**For the chemical compound ammonium sulphate, match the Element on the left with the Number of Atoms on the right. Numbers of Atoms may be used as often as necessary.
Reminder: Record your answers on the Response Form.**

Element	Number of Atoms
42. hydrogen	A. 1
43. oxygen	B. 2
	C. 4
	D. 8

44. The formula $MgCl_2$ represents an ionic compound.

- A. True
- B. False

45. Which of the following is the formula for the compound formed by calcium and bromine?

- A. CaBr
- B. Ca₂Br
- C. CaBr₂
- D. Ca₂Br₂

46. Which one of the following chemical equations is balanced?

- A. $2\text{Al} + \text{O}_2 \rightarrow \text{Al}_2\text{O}_3$
- B. $3\text{Al} + \text{O}_3 \rightarrow \text{Al}_2\text{O}_3$
- C. $3\text{Al} + 3\text{O}_2 \rightarrow \text{Al}_2\text{O}_3$
- D. $4\text{Al} + 3\text{O}_2 \rightarrow 2\text{Al}_2\text{O}_3$

47. Which of the following equations are balanced?

I	$2\text{Ca} + \text{O}_2 \rightarrow 2\text{CaO}$
II	$2\text{CO} + \text{O}_2 \rightarrow 2\text{CO}_2$
III	$\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$

- A. I and II only
- B. I and III only
- C. II and III only
- D. I, II and III

48. In what type of chemical reaction does an element take the place of one of the elements in a compound?

- A. synthesis
- B. neutralization
- C. decomposition
- D. single replacement

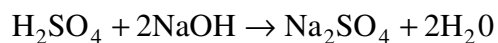
49. Which of the following represents a decomposition reaction?

- A. $\text{S} + \text{O}_2 \rightarrow \text{SO}_2$
- B. $2\text{Fe}_2\text{O}_3 \rightarrow 4\text{Fe} + 3\text{O}_2$
- C. $\text{FeS} + 2\text{HCl} \rightarrow \text{FeCl}_2 + \text{H}_2\text{S}$
- D. $2\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$

Match each Chemical Reaction on the left with the best Name of the Reaction on the right.
 Each Name of the Reaction may be used as often as necessary.
 Reminder: Record your answers on the Response Form.

Chemical Reaction	Name of the Reaction
50. $4K + O_2 \rightarrow 2K_2O$	A. synthesis
51. $BaS + 2HBr \rightarrow BaBr_2 + H_2S$	B. neutralization
	C. decomposition
	D. single replacement
	E. double replacement

Use the following information to answer question 52.



52. Which of the following statements are true?

I	H_2SO_4 is an acid.
II	Na_2SO_4 is a base.
III	This is a neutralization reaction.
IV	The products of this reaction are a salt and water.

- A. I, II and III only
- B. I, II and IV only
- C. I, III and IV only
- D. II, III and IV only

INSTRUCTIONS: For each question, select the **best** answer and record your choice on a separate piece of paper.

ANSWER KEY: 31. B 32. C 33. B 34. B 35. A 36. A 37. A 38. A 39. D 40. B 41. B
42. B 43. C 44. D 45. A 46. B 47. C 48. A 49. B 50. B 51. B 52. E 53. D

PHYSICAL SCIENCE**Chemicals and Reactions****REFER TO
DATA BOOKLET**

For this section of the examination, refer to:

- Names, Formulæ and Charges of Some Common Ions on page 1
- Alphabetical Listing of the Elements on page 2
- The Periodic Table on page 3

31. The nucleus of an atom contains electrons, protons and neutrons.
- A. True
B. False
32. Which atom will produce an ion with 21 protons, 24 neutrons and 18 electrons?
- A. argon
B. rhodium
C. scandium
D. chromium

Use the following information to answer question 33.

27

?

? represents the symbol of the element

13

33. Which of the following is true about the neutral atom of the element?

- A. I and II only
B. III and IV only
C. I, II and IV only
D. I, II, III and IV

I	The element is cobalt.
II	The element has 27 protons.
III	The element has 14 neutrons.
IV	The element has 13 electrons.

34. In which of the following compounds does iron have the same ion charge (combining capacity)?

I	FeS
II	Fe(OH) ₂
III	FeCrO ₄
IV	Fe ₂ (CO ₃) ₃

- A. I and II only
B. I, II and III only
C. II, III and IV only
D. I, II, III and IV
35. Which neutral atom has 22 neutrons and 18 electrons?

- A. argon
B. titanium
C. beryllium
D. zirconium

36. Which of the following statements about Be²⁺ are true?

I	It symbolizes an ion.
II	It symbolizes an atom.
III	Beryllium has lost electrons.
IV	Beryllium has gained electrons.

- A. I and III only
B. I and IV only
C. II and III only
D. II and IV only

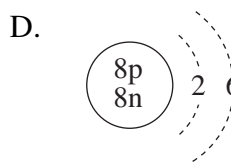
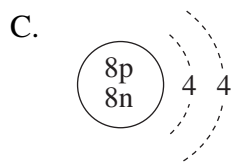
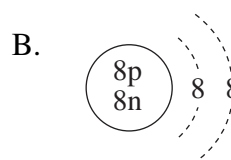
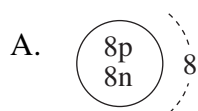
37. Different isotopes of an element have different numbers of neutrons.

- A. True
- B. False

38. Carbon-12 and Carbon-14 have the same number of protons.

- A. True
- B. False

39. Which of the following represents the Bohr model for an oxygen atom?



40. Halogens do not combine easily with metals.

- A. True
- B. False

41. The formula P_4 represents a polyatomic ion.

- A. True
- B. False

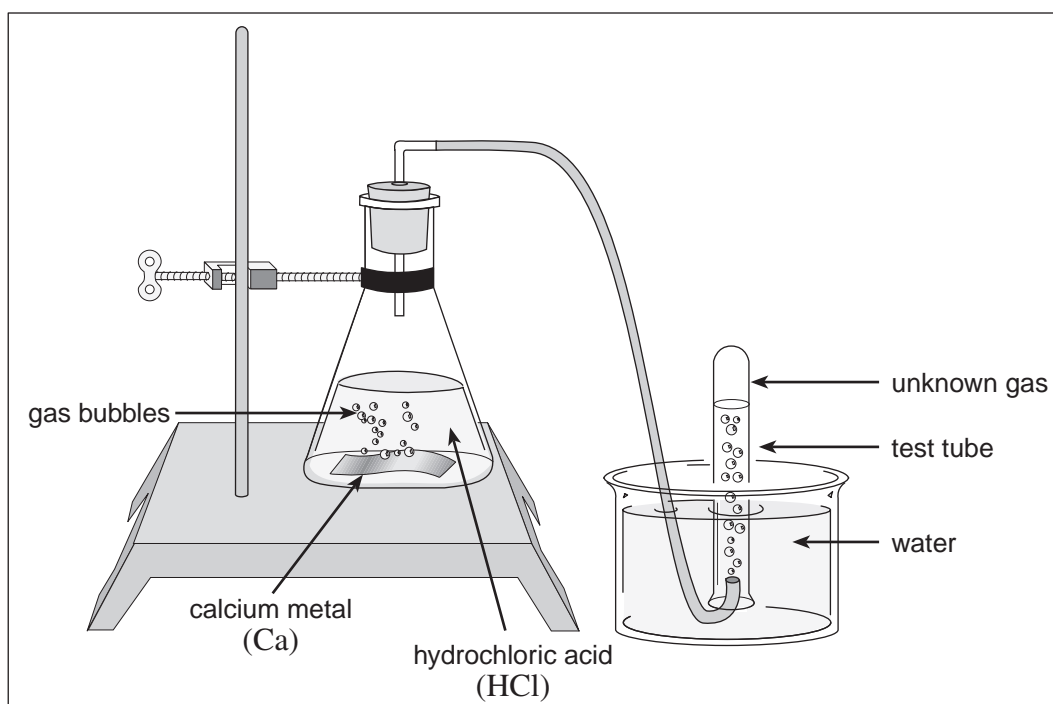
42. What is the formula for lithium oxide?
- A. LiO
 - B. Li₂O
 - C. LiO₂
 - D. Li₂O₂
43. What is the chemical formula for chromium (III) nitrite?
- A. Cr₃NO₂
 - B. Cr₃(NO)₃
 - C. Cr(NO₂)₃
 - D. Cr(NO₃)₃
44. What is the name of the compound Sn(SO₄)₂?
- A. tin sulphate
 - B. tin (I) sulphate
 - C. tin (II) sulphate
 - D. tin (IV) sulphate
45. Nitrogen trihydride is a covalent compound.
- A. True
 - B. False
46. The formula KMnO₄ represents a covalent compound.
- A. True
 - B. False

For the chemical compound hydrogen chlorate, match the Element on the left with the Number of Atoms on the right.



Element	Number of Atoms
47. oxygen	A. 1
48. chlorine	B. 2
	C. 3
	D. 5

Use the following diagram to answer question 49.



49. What is the balanced equation for the reaction?

- A. $\text{Ca} + \text{Cl}_2 \rightarrow \text{CaCl}_2$
- B. $\text{Ca} + 2\text{HCl} \rightarrow \text{H}_2 + \text{CaCl}_2$
- C. $\text{Ca} + 2\text{HCl} \rightarrow \text{CaH}_2 + \text{Cl}_2$
- D. $2\text{Ca} + 2\text{H}_2\text{O} \rightarrow \text{O}_2 + 2\text{CaH}_2$

50. Which of the following represents a decomposition reaction?

- A. $\text{H}_2 + \text{Cl}_2 \rightarrow 2\text{HCl}$
- B. $2\text{KClO}_3 \rightarrow 2\text{KCl} + 3\text{O}_2$
- C. $\text{Ca} + 2\text{HCl} \rightarrow \text{CaCl}_2 + \text{H}_2$
- D. $\text{AgNO}_3 + \text{KCl} \rightarrow \text{AgCl} + \text{KNO}_3$

Match each Chemical Reaction on the left with the best Reaction Type on the right. Each Reaction Type may be used as often as necessary.	
Chemical Reaction	Reaction Type
51. $\text{HCl} + \text{NaOH} \rightarrow \text{NaCl} + \text{H}_2\text{O}$	A. synthesis
52. $\text{Mg}(\text{NO}_3)_2 + 2\text{NaOH} \rightarrow 2\text{NaNO}_3 + \text{Mg}(\text{OH})_2$	B. neutralization
53. $2\text{Al} + \text{Fe}_2\text{O}_3 \rightarrow \text{Al}_2\text{O}_3 + 2\text{Fe}$	C. decomposition
	D. single replacement
	E. double replacement