Name: Key

Chapters 1-3 Review
Form: 0
Version: 0

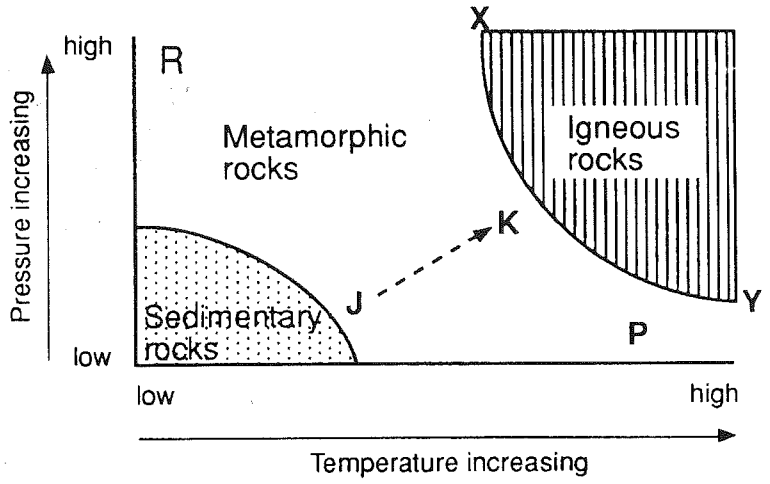
Refer to the Data Booklet for the "Mineral Data Sheet," "Table of Hardness," "Bowen's Reaction Series," and "% Minerals in Igneous Rocks." Good Luck!

1. Which of the following has existed unchanged from the time of earth's formation to the present?
   A. the continents
   B. the atmosphere
   C. mountain ranges
   D. none of the above

2. Geologist James Hutton's concept of how Earth's physical features were formed is called uniformitarianism because it states that the changes which have occurred over time have resulted from
   A. sudden catastrophies.
   B. eruptions of ancient volcanoes.
   C. natural forces which continue to work.
   D. hardening of the earth's crust.

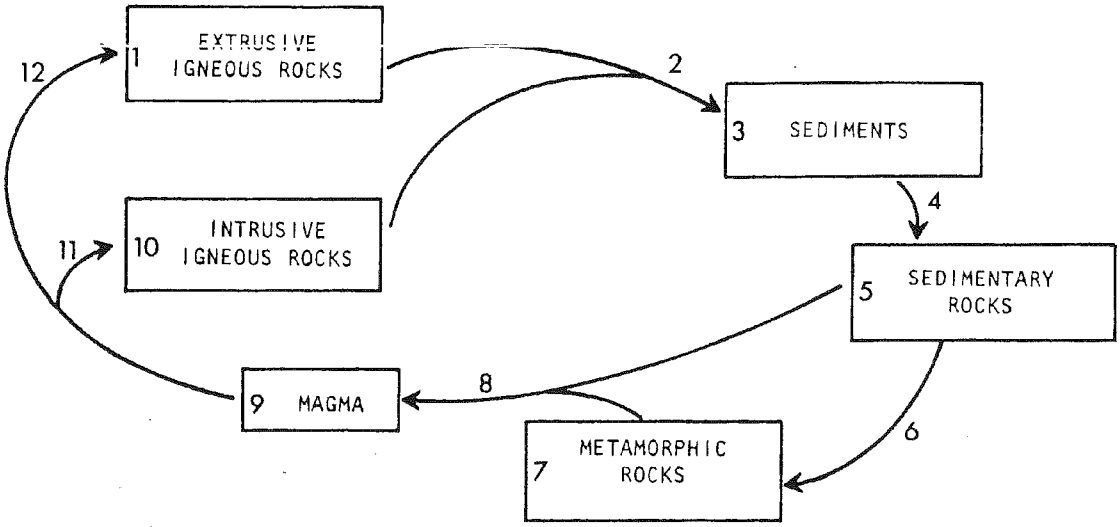
3. Use the graph below to answer this question.

The graph below shows the general conditions of temperature and pressure under which the major groups of rocks form.



If a rock is subjected to higher temperatures and pressure conditions beyond line X-Y as shown in the graph, it will
   A. melt.
   B. fault.
   C. bend.
   D. foliate.

4. Crustal uplift is most important in the formation of number:



A. 3
B. 5
C. 7
D. 9

5. The formation of igneous rock is a result of
   A. deposition and lithification.
   B. cooling and crystallization.
   C. heating and pressure.
   D. weathering and compaction.

6. In the rock cycle, rocks and other earth materials are classified by their
   A. origin.
   B. color.
   C. grain size.
   D. mineral composition.

7. Define the terms mineral and rock. (2 marks)

   Mineral: naturally occurring, inorganic, solid element or compound w/ reg. internal crystal structure and a definate composition

   Rock: a cohesive aggregate (mixture) of minerals

8. Geology, as a science, has some aspects in common with Physics, Chemistry and Biology, as well as some aspects which are very different from these other sciences. (5 marks)

   a) Describe one aspect of Geology which is drawn directly from each of the following: (3 marks)

   Physics: radiometric decay (geologic time), planetary orbits

   Chemistry: mineral compositions, crystal structure

   Biology: fossils

   b) The two aspects of Geology which make it different from the other sciences are Time and Scale. Explain how each aspect makes Geology different from the other sciences. (2 marks)

   Time: geological events take a very long time in human terms

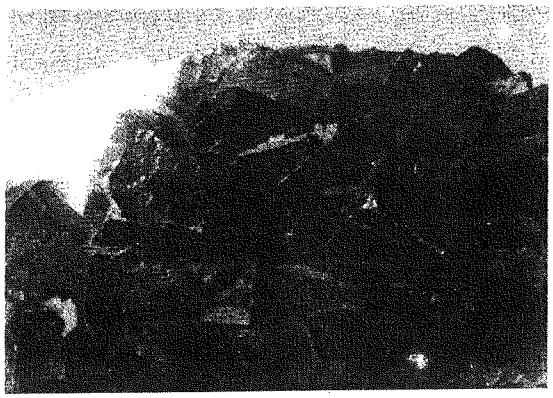
   Scale: most geological features are too large to duplicate and experiment with in the lab.

For the following questions, remember to use the "Mineral Data Table" as needed!

9. In addition to silicon, which one of the following elements is found in all the silicate minerals?
   A. Iron.
   B. Carbon.
   C. Oxygen.
   D. Magnesium.

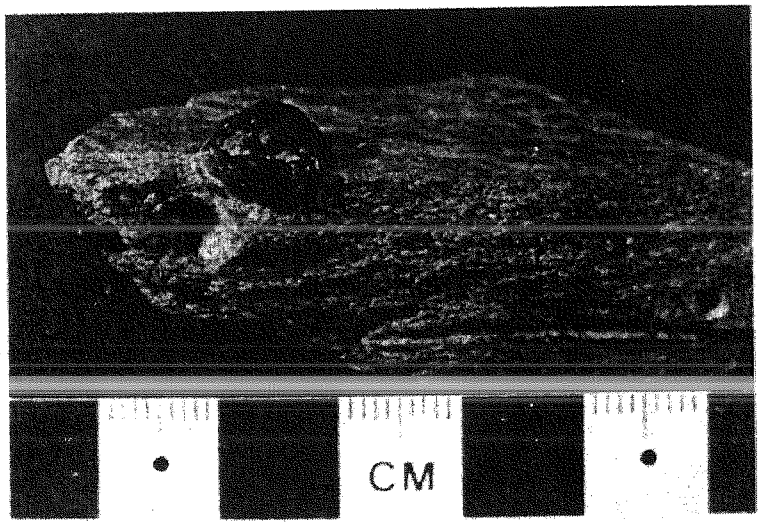
10. Which pair of minerals below are sulphides?
    A. Gypsum, barite.
    B. Halite, olivine.
    C. Magnetite, halite.
    D. Galena, pyrite.
    E. Fluorite, azurite.

11. For this question, refer to the Photograph and the table, Properties of Common and Important Minerals



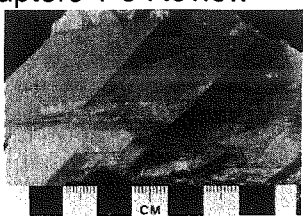
The vitreous mineral shown in the photograph can occur in many colours and also cleaves in more than three directions. The mineral is most likely

A. galena.
B. azurite.
C. fluorite.
D. sphalerite.



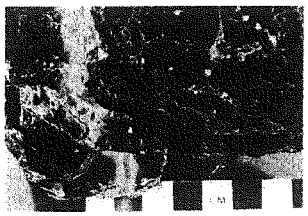
12. The prominent mineral in the rock shown in the photograph has a hardness of 7 and is commonly found in metamorphic rocks. The mineral is:

A. Quartz.
B. Garnet.
C. Hematite.
D. Sphalerite.

13. 

The white mineral shown in the photograph has a hardness of three. Its special property is that it

A. is strongly magnetic.
B. has a very high density.
C. dissolves very rapidly in water.
D. fizzes in dilute hydrochloric acid.

14. 

The identity of the mineral shown in the photograph is

A. mica.
B. hematite.
C. magnetite.
D. amphibole.

15. In how many directions does calcite have perfect cleavage?

A. 1
B. 2
C. 3
D. 4

16. Which of the following minerals has a non-metallic lustre?

A. Gypsum.
B. Galena.
C. Molybdenite.
D. Chalcopyrite.

17. Which of the following is NOT true of all minerals?

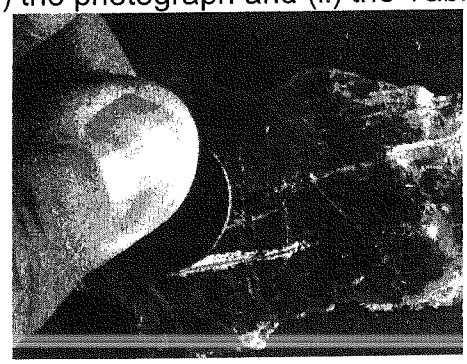
A. They are crystalline.
B. They contain one element.
C. They are naturally occurring.
D. They have a definite chemical composition.

18. Weakness in the crystal structure of a mineral result in

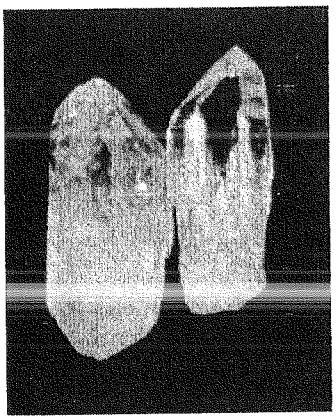
A. high lustre
B. low density
C. cleavage planes
D. conchoidal fracture

19. The colour of a mineral's powder is its
   A. Streak
   B. Luster
   C. Hardness
   D. Transparency

20. For this question, refer to (i) the photograph and (ii) the Table of Hardness



The test result shown in the photograph indicates that the Mohs hardness of the mineral is
   A. less than 3.5
   B. exactly 3.5
   C. between 3.5 and 5.5
   D. greater than 5.5

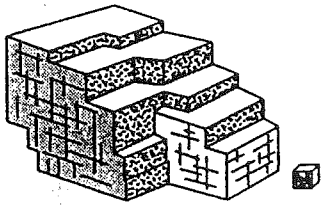


21. What is the hardness of the mineral in the photograph?
   A. 3
   B. 5
   C. 7
   D. 9

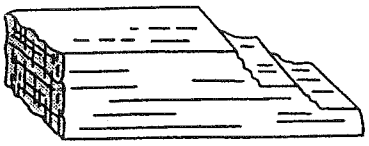
OBJECT	MOHS SCALE OF HARDNESS
Glass or steel knife	5.5
Wire nail	4.5
Copper penny	3.5
Fingernail	2.5

22.

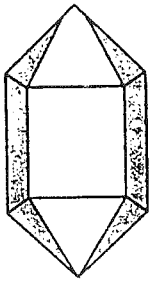
W



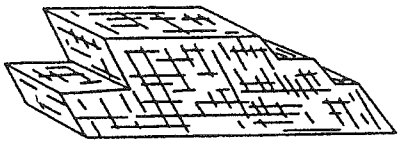
X



Y



Z



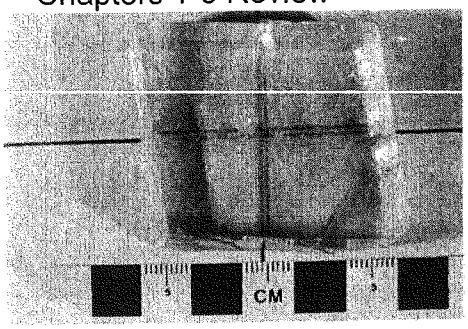
Use the four sketches of common minerals, the Table of Hardness and the Mineral Data Sheet to answer this question.
Mineral W has a metallic lustre and can be scratched by a copper penny. The mineral is

A. halite.
B. pyrite.
C. galena.
D. molybdenite.

23. Which of the following can best be used to distinguish between hematite and pyrite?

A. Streak.
B. Lustre.
C. Hardness.
D. Hydrochloric acid.

24.



The number of cleavage directions which the mineral in the photograph would have is

A. one.
B. two.
C. three.
D. four.

25. Of the following minerals, the one which shows conchoidal fracture is

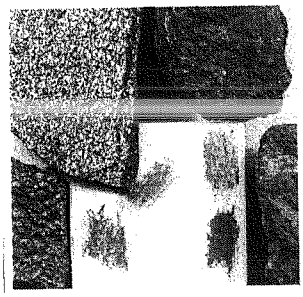
A. quartz.
B. feldspar.
C. pyrite.
D. calcite

26. Which of the following refers to the fracture of a mineral?

A. whether the refraction is single or double.
B. how easily broken it is.
C. the number and direction of its cleavages.
D. its tendency to separate along other than cleavage planes.

27.

OBJECT	MOHS SCALE OF HARDNESS
Glass or steel knife	5.5
Wire nail	4.5
Copper penny	3.5
Fingernail	2.5



Use the photograph, table of hardness and the mineral data table to answer this question. The different coloured specimens shown in the photograph are all varieties of the same mineral. The mineral can scratch a knife blade or can itself be scratched by a knife blade. The mineral is also very common in rocks which have been, at some time, oxidized. The mineral is

A. garnet.
B. hematite.
C. sphalerite.
D. magnetite.

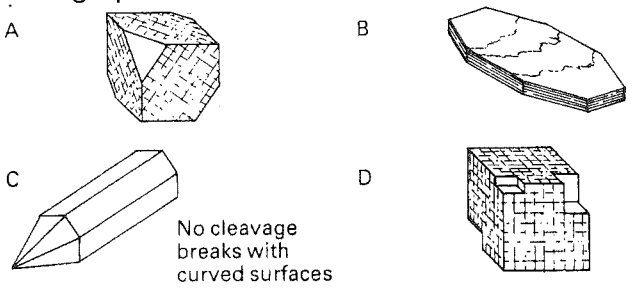
28. Oxygen and silicon are the two most abundant elements in the earth's crust. Support this fact using your knowledge of the abundance of common minerals and their composition. (1 mark)

silicates (made of Si + O) make up almost 75% of Earth's crust

29. Name a mineral which is characterized by each of the following sets of key properties: (5 marks)
    (a) perfect cleavage in one direction Chlorite, graphite, mica, molybdenite, talc
    (b) metallic lustre, light yellow color, hardness 6, striated cubes pyrite
    (c) cleavage in two directions at 90 degrees. feldspar, pyroxene
    (d) color steel grey, black, or dark brown; streak reddish brown hematite
    (e) cleavage absent, harder than glass. quartz, garnet, olivine

30. Describe at least TWO properties which would help you distinguish between the following minerals. (4 marks)
    (a) pyrite and chalcopyrite. hardness (6 vs 3.5), form (cubic vs tetrahedral)
    (b) calcite and bornite. colour (white vs blue), streak (white vs grey), lustre (vitreous vs metallic) etc.
    (c) fluorite and halite. cleavage (4 vs 3), hardness (4 vs 2.5), sg/density (3 vs 2)
    (d) quartz and feldspar. form (prismatic vs tabular crystals), cleavage (none vs 2), hardness (7 vs 6)

31. Study the diagrams of mineral crystals. Note that the faint lines (where shown) represent traces of cleavage planes.



(a) Fill in the chart below

	A	B	C	D
Crystal shape:	cubic	plates	prismatic	cubic
Cleavage/fracture:	4	1	conchoidal fracture	3
Mineral name:	fluorite	mica	quartz	halite/galena

(b) Which two of these minerals would you expect to be present in granite? (2 marks)

mica + quartz

(c) Explain why minerals develop a particular crystal shape and cleavage pattern.(2 marks)

internal crystal structure

weakness in crystal structure

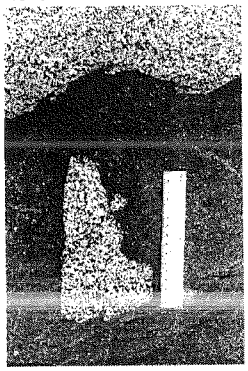
Remember to use the "Bowen's Reaction Series" and "% Minerals in Igneous Rocks" charts as needed!

32. Slow cooling of magma results in the production of
    A. small crystals only.
    B. large crystals only.
    C. dark coloured crystals only.
    D. light coloured crystals only.

33. According to Bowen's reaction series, which one of the following is the rock-forming mineral to show the **latest** crystallization?
    A. Quartz.
    B. Olivine.
    C. Biotite.
    D. Ca rich Plagioclase.

34. From left to right, the correct order for crystallization of the following minerals in magma is
    A. potassium feldspar, quartz, pyroxene.
    B. potassium feldspar, pyroxene, quartz.
    C. pyroxene, potassium feldspar, quartz.
    D. pyroxene, quartz, potassium feldspar.

35. Use this picture to answer the following 3 questions.



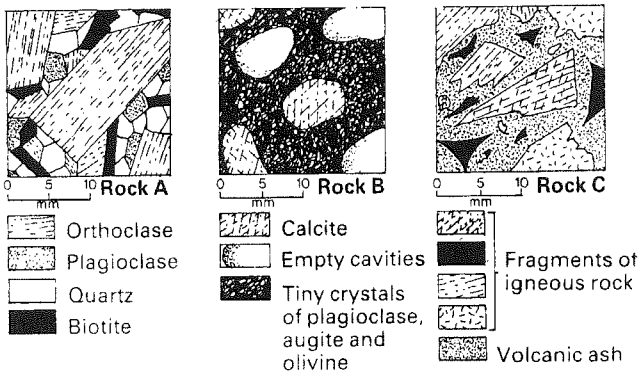
Which of the following terms BEST describes the dark-colored rock?
    A. Gneissic.
    B. Clastic.
    C. Mafic.
    D. Silicic.

36. The light-coloured rock would BEST be classified as
    A. intrusive.
    B. volcanic.
    C. sedimentary.
    D. metamorphic.

37. TWO features pictured in the photograph are
    A. a sill and a crystal.
    B. a dike and a xenolith.
    C. foliation and schistosity.
    D. exfoliation and layering.

38. The crystal size of an igneous rock depends upon the
    A. rate of cooling.
    B. minerals present.
    C. source of magma.
    D. temperature of magma.

39. Use the following diagrams of three igneous rocks and the chart of "Percentage of Minerals in Igneous Rocks" to answer the next **SIX** questions. Note that the mineral Orthoclase is Pink Potassium Feldspar..



The type of texture shown by rock A is
    A. clastic
    B. coarse grained crystalline
    C. fine grained crystalline
    D. pyroclastic
    E. fragmental

40. Rock A contains 70% pink potassium feldspar. Rock A is
    A. Diorite
    B. Granite
    C. Andesite
    D. Rhyolite

41. The molten rock from which Rock A formed cooled
    A. very rapidly
    B. very slowly
    C. rapidly then slowly
    D. slowly then rapidly

42. Rock B contains cavities, some of which have filled with calcite. The cavities most likely formed by
    A. erosion of the rock
    B. gas bubbles in the molten rock
    C. freeze thaw weathering
    D. dissolving with carbonic acid

43. Rock B contains 60% dark ferromagnesian minerals and 40% plagioclase feldspar. Rock B is
    A. basalt
    B. peridotite
    C. andesite
    D. gabbro

44. Rock C most likely formed by
    A. intrusion into country rock
    B. fast flow down the sides of a volcano
    C. transport and deposition from a fast flowing river
    D. an explosion

45. For the next two questions, refer to the photograph

    Which of the following best describes the igneous texture of the rock shown in the photograph?
    A. glassy
    B. vesicular
    C. fine-grained
    D. coarse-grained

46. The texture of the igneous rock shown in the photograph indicates that the rock cooled
    A. slowly within the earth.
    B. rapidly within the earth.
    C. slowly on the earth's surface.
    D. rapidly on the earth's surface.

47. An igneous rock containing coarse crystals in a fine-grained or glassy matrix is described as
    A. felsic
    B. vesicular
    C. porphyritic
    D. plutonic

48. The volcanic compositional equivalent of gabbro is
    A. rhyolite
    B. basalt
    C. andesite
    D. obsidian

49. Which one of the following rocks could be described as pyroclastic?
    A. tuff
    B. rhyolite
    C. syenite
    D. basalt

50. A coarse-grained igneous rock which contains 50% ferromagnesian minerals and 50% plagioclase feldspar would be called
    A. diorite.
    B. gabbro.
    C. granite.
    D. rhyolite.

51. A fine-grained igneous rock, when examined using a microscope, is found to contain 30% dark ferromagnesian minerals. Which other minerals would you expect to find in this rock?
    A. plagioclase feldspar only
    B. plagioclase feldspar and muscovite
    C. potassium feldspar, muscovite and quartz
    D. plagioclase feldspar, potassium feldspar and quartz

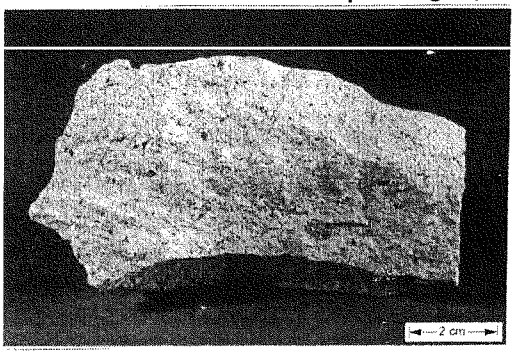
52. Use the Percentage of Minerals in Igneous Rocks table and the following table to answer the next **THREE** questions.

Percentage of minerals in four samples of igneous rocks

Mineral composition	Rock W	Rock X	Rock Y	Rock Z
Quartz	40	16	0	2
Pink potassium feldspar	53	20	0	2
Plagioclase feldspar	6	42	5	64
Dark ferromagnesians	7	22	95	32
All other minerals	4	0	0	0

Which of the igneous rocks above would be considered ultramafic?
A. W
B. X
C. Y
D. Z

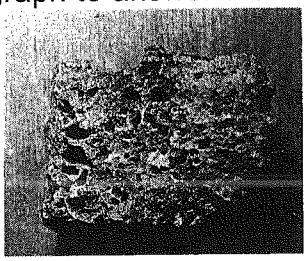
53. Rock W is shown in the photograph.



This rock is
A. basalt.
B. gabbro.
C. granite.
D. rhyolite.

54. The correct percent composition of quartz in the compositional equivalent of W is
A. 10-30%
B. 30-50%
C. 50-70%
D. 70-90%

55. Use this photograph to answer the following quetion.



The dark rock in the photograph is best classified as
A. silicic
B. mafic
C. clastic - peices glued together
D. phaneritic - large crystals

56. A coarse-grained igneous rock has the mineral composition shown below.

Quartz	K Feldspar	White Plagioclase	Ferromagnesian
17%	20%	40%	23%

The rock would be classified as
A. diorite.
B. granite.
C. gabbro.
D. andesite.

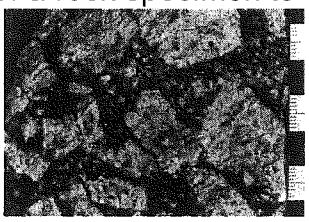
57. Of the following, the factor which most affects the colour of granite is?
    A. how long it takes to form.
    B. the feldspar it contains.
    C. the place where it is found.
    D. the erosion it withstood.

58. Which of the following causes a chilled margin of fine-grained igneous material to be found at the edges of plutons?
    A. Rapid cooling.
    B. Partial melting.
    C. Contact metamorphism.
    D. Fractional crystallization.

59. A concordant, sheet-like body of intrusive igneous rock is called a
    A. Batholith
    B. Flow
    C. Sill
    D. Pluton
    E. Dyke

60. After the surrounding country rock has been eroded, which pluton is a wall-like rock formation?
    A. dike
    B. sill
    C. laccolith
    D. volcanic neck

61. Use the photograph of a rock specimen to answer this question.



a) Examine the differences in size, shape and arrangement of the crystals in the specimen shown in the photograph, and describe how the rock would have developed this texture. (2 marks)

2 stages of cooling
slow forming large crystals
than fast " small "

b) Give reasons for concluding that the rock shown in the photograph would have crystallized at relatively low temperatures. (1 mark)

light coloured phenocrysts solidify at lower T
and that

62. What effect do the following have on the melting point of rock? Why? (4 marks)

a) Increased pressure: (2 mark)

increases m.p. since pressure keeps molecules together until more heat is added.

b) Increased amounts of volatiles (e.g., water and carbon dioxide): (2 mark)

lowers m.p. – the more volatiles, the lower the melting T.

63. a) The chemical composition of molten rock from a deep magma chamber may be changed by a number of different processes as it moves upward towards the surface. Describe how two of these processes, Wall Rock Assimilation and Fractional Crystallization can change the chemical composition of the magma.

Wall Rock Assimilation: (1 mark) rocks melted in magma (usually silica rich) make magma composition (" " richer)

Fractional Crystallization: (2 marks) if olivine crystallizes and sinks to bottom makes magma more silica rich

b) If the changes to the composition of the molten rock resulted in a silicic (felsic) magma, what type of eruption would result when the magma reached the surface? (1 mark) answer: explosive (not on test this time)

(upside down, glued here)

54 MC

9 column # 6

1 9
2 10
3 11
4 12
5 13
6 14

for more provincial exam type questions go to online.sd43.bc.ca then the Geology page and there is a link near the bottom.

You have completed the test!