Tshwane University of Technology

We empower people

Environmental Earth Studies II **13 September 2023**

EVE206D

Semester Test III

National Diploma: Environmental Sciences

Lecturer: Mr S.G Sibeko

Question 1

1. Name the processes that control sedimentary rocks on earth surface? (7)

Weathering, erosion, transport, deposition, sedimentation burial and diagenesis.

2. Differentiate between clastic sediment and chemical and biochemical sediments? (4)

Solid fragments produced by weathering from pebbles and boulders to particles of sand silt and clay are known as clastic particles. Accumulations of such materials are clastic sediments.

Dissolved products of weathering are ions or molecules in the waters of soils, rivers lakes, and oceans. These dissolved products are precipitated from water by chemical and biochemical reactions and accumulate as chemical and biochemical sediments.

1.3 Sedimentary Rocks/ clastic sediments can be transported in four ways. List these four ways in which clastic sediments/ sedimentary rocks can be transported. (4)

Transportation by current.

Transportation of dissolved materials

Transportation by glaciers

Transportation and weathering

1.4 With the aid of a diagram show how the roundness of grains can be used to determine the distance that the grains have travelled? (4)

The more angular the fragments the shorter the distance they have travelled

The more rounded the fragments the longer the distance they have travelled

See diagram

Question 2

2.1 Describe in detail how sedimentary rocks are classified on the basis of their textures and also on their grain sizes. (6)

Grain size

Coarse grained – Gravels – Conglomerates

Medium grained – Sands – Sandstones

Fine grained – Silts – Siltstones

- Clays and Mud – Mudstone and Shales

Textures

Quartz rich and feldspar rich sandstones

Calcareous siliceous and organic rich shales

Question3

1. Explain the following agents of metamorphism (thermodynamic variables).

    1. Temperature (2)

        The temperature(heat)that causes rocks to change during the process of metamorphism can be ascribed to:

        -Geothermal gradient of the earth

        i.e. the increase in temperature with an increase depth below the surface of the earth.

        -the heat energy released by the decay of radioactive

        elements.

    2. Confining pressure (1)

        The confining pressure i.e. the pressure related to depth below surface.

    3. Fluid pressure (1)

        Fluid pressure that is the pressure exerted by fluids in pores spaces mainly account for pressure

3.2 List the type of reactions that take place during prograde and retrograde metamorphism (3)

Dehydration reactions

Decarbonation reactions if carbon dioxide is the vapour phase (limestone).

hydration reaction (solid + water (hydrated) solid).

Question 4

4.1 What are foliations and lineations in metamorphic rocks and give an example of minerals that are said to be foliated or lineated? (4)

Foliation –planar arrangement of textural and structural features in metamorphic rocks.

Example: Mica

Lineation- linear arrangement of textural and structural features in metamorphic rocks.

Example: Hornblende

4.2 Name the three types of foliations and also the metamorphic rock associated with each type of foliation. (3)

Cleavage - Slate

Schistosity – Schist & Phyllite

Colour banding - Gneiss

3. Explain the following metamorphic rock textures: (3)

1. Granoblastic texture

-Mineral grains all have the same size and shape and are equidimensional.

-Do not posses foliations because it is even grained.

2. Poikiloblastic texture

-Porphyroblasts conatin numerous smaller inclusions which are randomly orientated.

3. Mylonitic texture.

-A variety of fine grained rock which has a streaky

appaearance because of intense deformation through

solid state ductile flow.

4.4 Metamortphic rocks can be divided into three major groups based on the texture. List these three major groups and give an example of the rocks found in each group. (8)

The major types of foliated rocks are: slate, phyllite, and gneiss

The major non-foliated or massive rocks are: quartz, serpentinite and soapstone

Metamorphic rocks like crushed breccia ,augen gneiss and mylonite are classified as clastic rock.

Migmatite is a mixed rock.

Total Marks: 50 Marks