

ORDRE DES INGÉNIEURS DU QUÉBEC
November 2017 session

All documentation allowed
Calculators : authorized models only
Duration of the examination : 3 hours

14-GE-A3 SEDIMENTATION AND STRATIGRAPHY

1- Classification of Sedimentary Rocks et Stratigraphic code

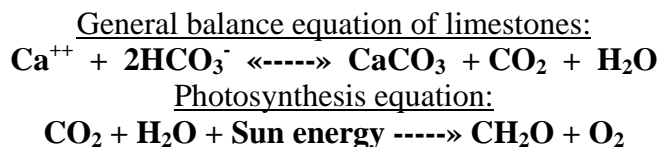
- I) Considering the grain size and the mineralogic composition, define the terms A and B.
A) lithic conglomerate (5 points);
B) calcilutite (5 points).
- II) According to the North American Stratigraphic Code, define the terms C and D :
C) Formation (5 points);
D) System (5 points).

2- The turbidites

- A) Taking into consideration that a turbidite is a strata formed by a turbidity current, how do you recognize a turbidite in the field (give the principal characteristics of a turbidite and illustrate your answer with a schematic drawing) (10 points) ?
- B) Explain briefly how the vertical succession of the sedimentary structures in the turbidites is formed (types of load transport, flow regimes, velocity variations, etc.) (10 points) ?

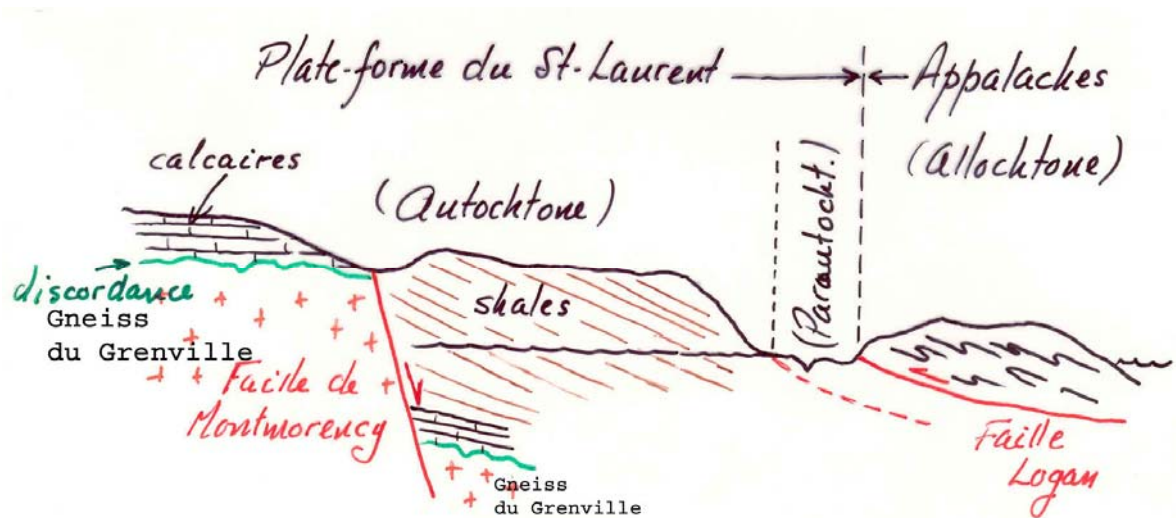
3- The limestones

Taking into consideration the general balance equation of limestones and the photosynthesis equation below, discuss in few words how the increase of the five following factors affect the precipitation of carbonates : 1- The seawater salinity (5 points), 2- The seawater temperature (5 points), 3- The depth of the water in marine environment (5 points), 4- The photosynthesis (5 points), 5- The seawater circulation through the pores in high energy environment, as in a reef margin (5 points).



4- Stratigraphy

NW-SE geological section near Quebec city, showing stratigraphic and structural relationships between the Mesoproterozoic gneisses of the Canadian Shield (Grenville), the Ordovician limestones and shales (calcaires et shales) of the St-Lawrence Platform and the Cambrian Appalachian flysch.



- A) Give in **chronologic order** the different steps of the geologic and structural history of this area. Use terms as : sedimentation of, metamorphism of, folding of, erosion of, fault, thrusting, etc. (20 points)
- B) The geochronologic age of the shales is defined by the assemblage zone, with the following species A, B, C, and D. The ages for each of these species are : A (Middle Cambrian to Permian), B (Ordovician to Mississippian), C (Late Ordovician to Pennsylvanian) et D (Late Cambrian to Ordovician). **What is the geochronologic age of the shales? Be as accurate as possible.** (5 points)

5- Petroleum geology

Explain briefly what are the geologic key elements that conduct to the formation of a petroleum deposit (10 points).