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RAJARATA UNIVERSITY OF SRI LANKA
FACULTY OF APPLIED SCIENCES

B.Sc. (General) Degree in Applied Sciences
Third Year - Semester I Examination – September / October 2019

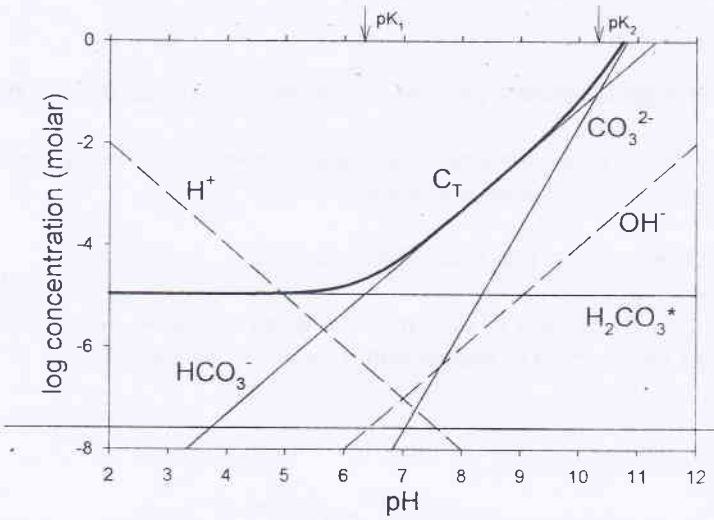
CHE 3208 –ENVIRONMENTAL CHEMISTRY

Time: Two (02) hours

Answer four (04) questions only.
Use of a non-programmable calculator is permitted.

1. a) Describe the differences between open and closed CO_2-water environmental systems giving examples.

b) The variation of inorganic carbon species in water is shown below. State the initial conditions used in the construction. Deduce the pH of unpolluted rainwater using the diagram.



c) How can acid rain conditions occur? Discuss the environmental impact due to acid rains.

d) How ancient Sri Lankans harvested rain water? Discuss the drawbacks of present day rainwater harvesting programs. (100 marks)

2. a) Comment on the status of nitrate pollution of potable water in Sri Lanka.

   b) Discuss two health hazards due to enriched nitrates in potable water.

   c) Suggest a treatment method based on green technology to remediate excess nitrates in Sri Lanka.

   d) Explain the role of nutrients in surface water eutrophication (100 marks)

3. a) State the meaning of heavy metal pollution. Why is chelation therapy of heavy metal toxicity treatment not safe?

   b) Discuss mercury pollution status of Sri Lanka. Postulate mercury distribution pathways in the environment.

   c) Discuss the dual hazardous nature of methylated mercury?

   d) Some metal ions act as indirect carcinogens. Discuss crtically. (100 marks)

4. a) Discuss the occurrence of primary and secondary atmospheric pollutants.

   b) Explain major indoor pollutants in Sri Lankan houses.

   c) Discuss the differences and similarities between London and Los Angeles smog.

   d) Why the Government of Sri Lanka imposed emission tests for automobiles? State the operation principle of catalytic converters in automobiles. (100 marks)

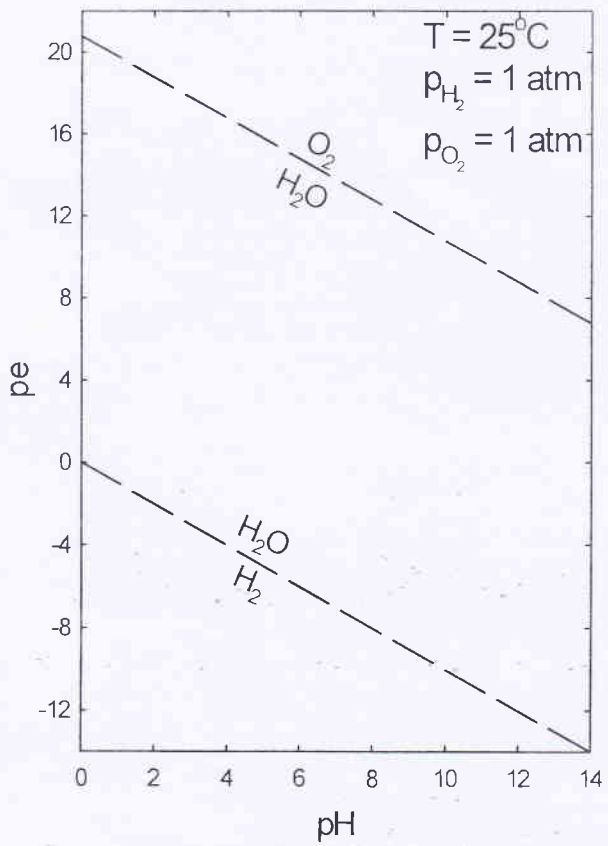
5. a) How acid mine drainage is formed? Discuss environmental impacts of acid mine drainage.

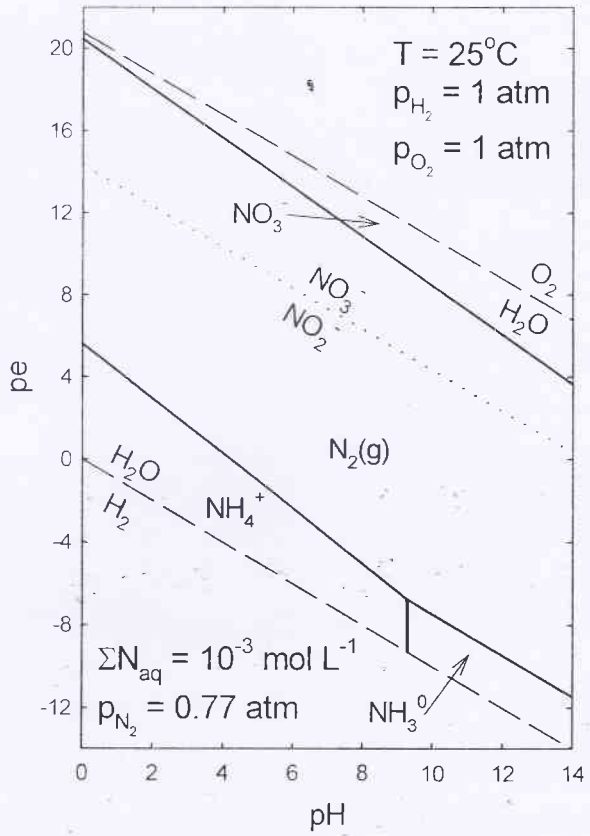
   b) pe-pH diagram is shown in the diagram given below. Identify following environments, clearly. Sea water, rain water, ground water, acid mine drainage.

   c) How arsenic pollution happens due to acid mine drainage.

   d) Nitrogen species pe-pH diagram is shown in the attached figure. State half-cell reactions for $NO_3^- \rightarrow NH_4^+$ and $NO_3^- \rightarrow NO_2^-$ conversion. Comment on the stability of nitirite ion in the environment. (100 marks)

Diagrams required to answer question 5 (attach this sheet in your answer book)





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