THE OPEN UNIVERSITY OF SRI LANKA

B.Sc DEGREE PROGRAMME/ STAND ALONE COURSES- LEVEL 5

CHU 3237/CHE 5237 INDUSTRIAL CHEMISTRY- PAPER I

FINAL EXAMINATION- 2006/2007

(2 ½ HOURS)

Wednesday 18th April 2007 *10.00 a.m.- 12.30 p.m.*

Reg. No.: .....

Attempt as many questions as possible.

Total mark allocated to this paper is 120. However, the maximum a candidate can score is 100 marks. Those who obtain more than 100 will be deemed to have scored 100 marks.

1. For what purpose do we use the following processes in ceramic industry?
   Powder pressing .....
   Drain casting .....
   Biscuit firing ..... (3 marks)

2. Name the main disadvantage of traditional ceramics. (3 marks)

3. What is the difference between transparent glaze and matt glaze? (4 marks)

4. Titanium dioxide is one of the common chemicals used in glazing. What role is played by TiO_2 in a glaze? (4 marks)

5. Give four sources of essential oils and the major chemical component present in each of them. (4 marks)

6. What is the difference between spice oleoresin and spice oil? (4 marks)

7. Give one example for each of the following compound category with a spice as its source.

i. Phenyl propanoid .....
ii. Monoterpene .....
iii. Sesquiterpene .....

(6 marks)

8. Suggest an analytical method to determine the content of capsaicin in a chillie powder sample.

(4 marks)

9. In Sri Lanka, salt is entirely produced by solar evaporation of seawater. Write other methods of production of salt. (4 marks)

10. How can gypsum and magnesia be obtained from seawater? (4 marks)

11. Write equations to show the essential steps involved in the production bromine and potassium from seawater. (4 marks)

12. Write equations to show how soda ash can be obtained from trona (Wyoming).

(4 marks)

13. What do you mean by 'metal finishing'?
How many grams of lead will be deposited from a solution of Pb^{2+} ions by a current of 0.15 A flowing for 1 hour? (Pb= 207.2; 1 F= 96500 C) (5 marks)

14. What do you mean by 'throwing power'?
Write the mathematical expression for throwing power in terms of weights w_1 and w_2 of the electrodes and distances x_1 and x_2 from them. (5 marks)

15. List the main factors that determine the value of throwing power. (3 marks)

16. When the metal ion in the plating bath is present in the form of complex ion, plating becomes uniform. Give reasons. (3 marks)

17. Write chemical equations to show how apatite from Eppawala in Sri Lanka can be converted to its useful products. (4 marks)

18. Write down the raw materials and methods used to extract:
Iron ....
Aluminium .... (4 marks)

19. Write two major sources of sulphur. (2 marks)

20. Primary processing of rubber involves many chemical steps including coagulation.
What are the other steps? How is coagulation brought about? (6 marks)

21. Write the four main crystalline phases present in cement clinker. (4 marks)

22. Identify the crystalline phase(s) responsible for

initial set .....

early strength .....

long-term strength .....

(4 marks)

23. Write the order in which the rate of hydration of these crystalline phases increases.

(4 marks)

24. Distinguish between setting and hardening (4 marks)

25. Distinguish between flash setting and false setting with respect to setting of cement.

(4 marks)

26. Write down **three** tests that can be used to confirm the identity of an oil.

i. ii.

iii. (3 marks)

27. Define 'saponification value' of a fat. (2 marks)

28. Draw the full structure of fatty acid: C15:2 ω 6, 9. Number the whole carbon chain.

(4 marks)

29. What do you understand by the term 'octane number'? What is its significance in relation to its use as a fuel? (4 marks)

30. State the product formed in each of the following reactions: (6 marks)

$$\text{Toluene} \xrightarrow[480^{o}\,C]{\text{zeolite}} ?$$

$$\text{Propylene} \xrightarrow[\text{catalyst}]{\text{Ziegler Natta}} ?$$

$$CH_4 + H_2O \underset{\text{steam reforming}}{\overset{\text{Ni}}{\rightleftharpoons}} ?$$

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