



KENYATTA UNIVERSITY
UNIVERSITY EXAMINATIONS 2010/2011
INSTITUTIONAL BASED PROGRAMMES (APRIL SESSION)
EXAMINATION FOR THE DEGREE OF BACHELOR OF EDUCATION AND
BACHELOR OF SCIENCE

SCH 400: COMPARATIVE STUDY OF TRANSITION ELEMENTS

DATE: Friday 31st December 2010

TIME: 11.00a.m – 1.00p.m

INSTRUCTIONS:

Answer all questions

- 1
- a) Define a transition element and give specific examples to illustrate. (3 marks)
 - b) Give a plausible explanation for each the following observation:
 - i) Most transition metal ions and compounds are coloured. (3 marks)
 - ii) Transition metals form compounds in which they show variable oxidation states. (3 marks)
 - iii) A good number of transition metals or their compounds have a catalytic properties. (3 marks)
 - iv) Most transition metal ions and compounds are paramagnetic. (3 marks)
 - c) Transition metals do not occur in free state in the earth's crust except for a few such as Cu, Ag, Au and Hg. (3 marks)
 - d) The chemistry of the first transition series elements shows some significant differences from those of the heavier second and third series elements.
 - i) Briefly describe three of the major differences (6 marks)
 - ii) Explain why the second and third transition elements show many similarities in their chemistry. (2 marks)
- 2
- a) Explain why natural TiO_2 cannot be used as it is for making white paint. (3 marks)

- b) Using relevant equation, explain how you obtain pure titanium from its ore
(5 marks)
- c) i) Using relevant equations (or scheme) show how Ziegler – Natta catalyst is used in the polymerization of ethane.
(8 marks)
- ii) Why is Ziegler – Natta catalyst better than ordinary free radical catalyst?
(3 marks)
- 3 a) Compare and contrast the chemistry of vanadium with that of its congeners. You may use the halides, oxides, or oxohalides species formed by these elements to illustrate your answer.
(10 marks)
- b) Draw the possible structures of:
- i) Mn_2O_7 (2 marks)
- ii) Re_3Cl_9 (2 marks)
- iii) VF_5 (2 marks)
- c) Explain briefly the reason(s) why
- i) Whereas $Co(H_2O)_6^{+2}$ and $Rh(H_2O)_6^{+2}$ are known no $Co(H_2O)_6^{+3}$ and $Zr(H_2O)_6^{+2}$ are known.
(4 marks)
- ii) When $CrBr_3$ is dissolved in water, all the bromide ions can be precipitated by addition of lead nitrate. On the other hand, when tungsten (III) bromide, WBr_3 , is dissolved in water, only a third of the bromides can be precipitated using lead nitrate.
(5 marks)