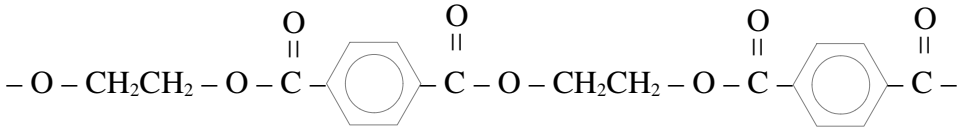
Year 12 Chemistry Test **NAME**_____

Topic 5: Materials

TOTAL MARKS: 41

1.



(a) Circle a group that identifies this polymer as a polyester. (1 mark)

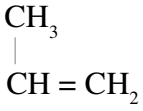
(b) Identify the polymer above as a condensation or an addition polymer.

_____ (1 mark)

(c) Draw the structural formulae for the monomer(s) used to make the polymer above.

(2 marks)

(d) Draw the structural formula of a section of the polymer that would form from the monomer below:



(2 marks)

(e) State one advantage and one disadvantage of synthetic polymers.

_____

_____

(2 marks)

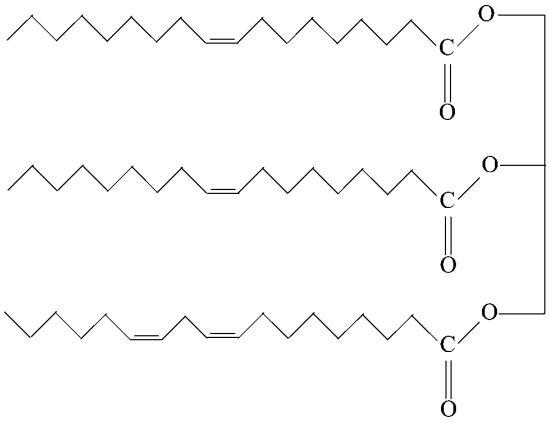
(f) State one structural and one physical difference between thermosets and thermoplastics.

_____

_____

_____(2 marks)

2. The structural formula of one triglyceride molecule is shown below.



The process of saponification can be used to produce soap molecules from this triglyceride.

(a) State the reaction involved in saponification.

_____(2 marks)

(b) Draw a labelled diagram showing how the anions in soap arrange to clean grease from an object.

(2 marks)

(c) Explain why hard water reduces the effectiveness of a soap's cleaning action.

_____

_____

_____

_____(2 marks)

(d) Explain how the zeolite with formula $Na_2(Al_2Si_3O_{10}).2H_2O$ is able to remove hardness from water.

_____

_____

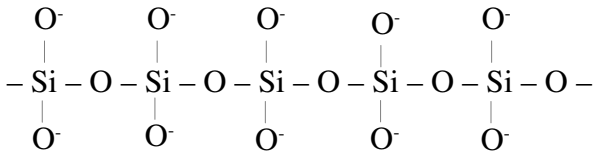
_____

_____

_____(3 marks)

3.

(a) Identify the repeating unit of the silicate below. (1 mark)



(b) Write the formula of the silicate anion above.

_____(1 mark)

(c) Describe the common structural unit in all silicates.

_____

_____

(2 marks)

(d) State the charge on a silicate anion that has an Si:O ratio of 5:12.

_____(1 mark)

(e) Write the formula of a silicate mineral containing $Si_2O_5^{2-}$ anions and Fe^{3+} cations.

_____(1 mark)

(f) State the value of x in $Al_2(Si_2O_6)_2^{x-}$.

_____(1 mark)

4. Detergent formulations often contain additives such as bleaches.
Oxygen bleaches use hydrogen peroxide as a bleach.

(a) State the oxidation number change when hydrogen peroxide acts as a bleach.

_____(2 marks)

(b) State the type of agent hydrogen peroxide acts as when it is a bleach.

_____ (1 mark)

(c) Another common additive to detergent formulations is sodium hypochlorite (NaClO).
State the pH above which chlorine bleaches are most stable.

_____ (1 mark)

(d) Enzymes are often added to detergent formulations.
Describe one advantage of the addition of enzymes to detergent formulations.

_____

_____(1 mark)

(e) Many stains can be removed by the use of an appropriate solvent, without the addition of a bleach.
Suggest and explain an appropriate solvent for a polar stain.

_____

_____

_____

_____(3 marks)

5.

(a) Draw the structure of the linear tripolyphosphate ion.

(2 marks)

(b) State two advantages of adding tripolyphosphate ions to detergent formulations.

_____

_____

(2 marks)

(c) Describe the consequences of the release of detergents containing phosphates into the waterways.

_____

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_____

_____(3 marks)