

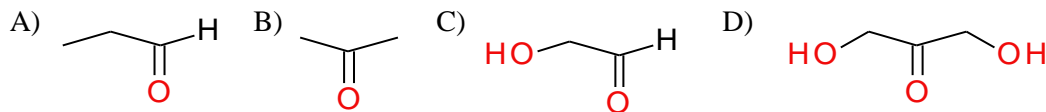
*Use your scantron to answer questions 1-33. Some Questions may have more than one answer.  
Write answers to the questions without numbers directly on the exam.*

**Section: 6-1 Classes of carbohydrates**

1. What are some of the functions of carbohydrates in living organisms (plants and animals).

- A) Energy    B) Energy Storage    C) Structure    D) Communication between cells    E) All of these.

2. Which of the following is a carbohydrate?



3. How many monosaccharides are connected to each other in a disaccharide?

- A) 1    B) 2    C) 3    D) 4

4. Which of the following is a disaccharide?

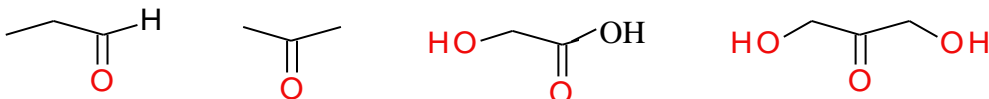
- A) Glucose    B) Sucrose    C) Starch    D) Mannose

5. Carageenan is a seaweed extract used as a food additive. It contains up to 25,000 carbohydrate unit. What is the correct classification of carrageenan?

- A) Monosaccharide    B) Disaccharide    C) Oligosaccharide    D) Polysaccharide

**Section 6.2 Functional groups in monosaccharides**

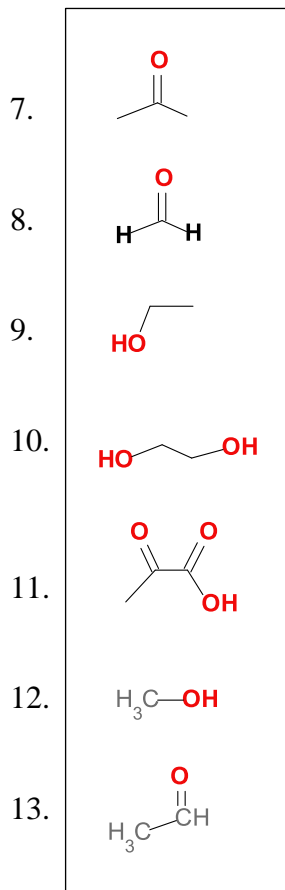
(6 pt) Mark and identify each of functional groups in the following compounds.



6. What functional group is present in all carbohydrates?

- A) carbon    B) alcohol    C) aldehyde    D) ketone    E) aldehyde and alcohol

The following compounds are very common alcohols, aldehydes and ketones. Match these with their names on the right.



A) formaldehyde

B) ethanol

C) methanol

D) acetone

E) ethylene glycol

AB) acetaldehyde

CD) pyruvic acid

*Select the compound from the right that matches the descriptions below.*

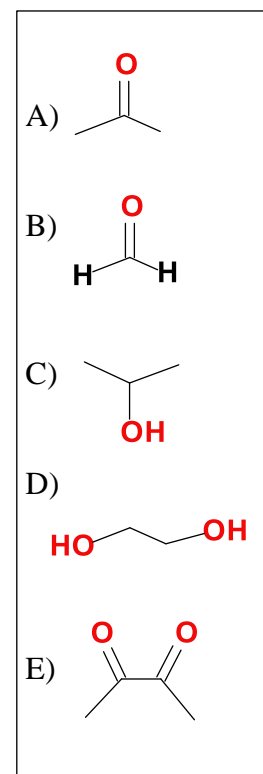
14. This is commonly used as a solvent and in finger nail polish remover.

15. This is used as antifreeze.

16. This compound is used to preserve biological specimens.

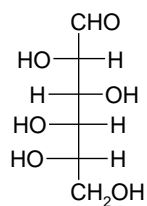
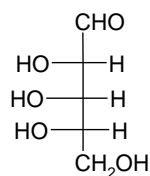
17. This compound has the flavor of butter.

18. This is commonly used as an antiseptic.



24 pt

(10 pt) Classify each of the following monosaccharides according to their stereochemistry, functional group and number of carbon atoms. I asked you to memorize the names of these. Write the names in the space provided.

AB

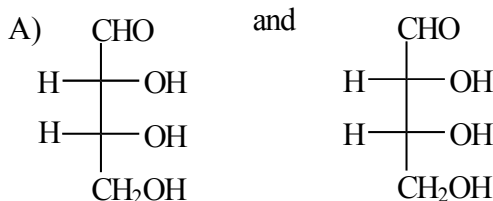
CARB	CLASSIFICATION	NAME
A		
B		

### Section 6.3 Stereochemistry in monosaccharides

For each of the stereochemical descriptions on the left, select the correct answer from the structures on the right.

***There may be more than one correct answer for some of these. Mark all that are correct.***

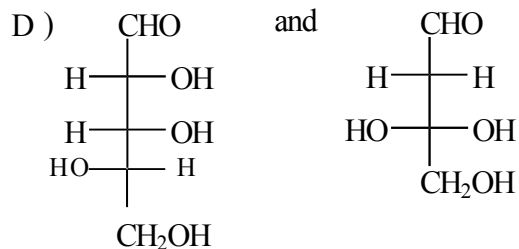
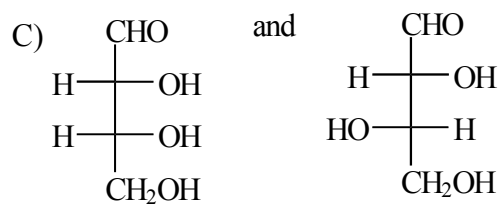
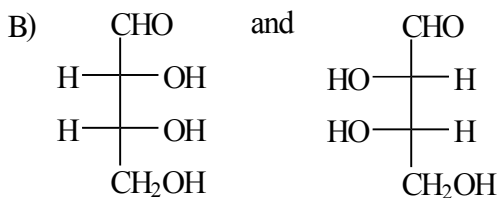
19. Enantiomers



20. Diastereomers

21. Epimers

22. Different compounds



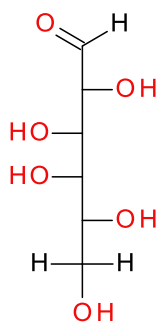
E) NO ANSWER IS CORRECT

18 pt

(4 pt) Draw and label the Fischer projections of D and L ribose.

**Section 6.4 Reactions of monosaccharides**

(6 pt) Draw the  $\alpha$  and  $\beta$  cyclic structure for the following monosaccharide:

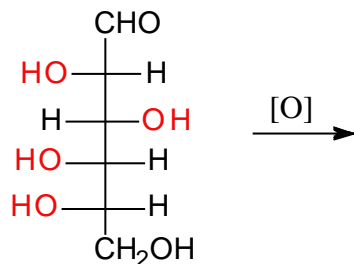


alpha ( $\alpha$ )

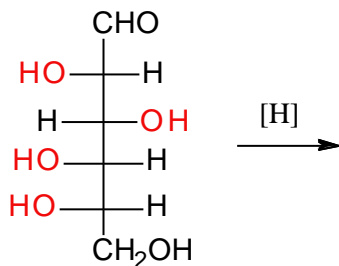
beta ( $\beta$ )

Write the products for the following reactions that occur with carbohydrates

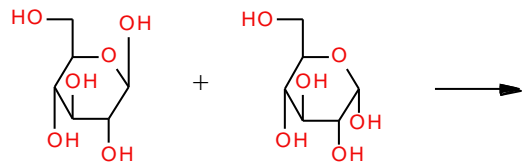
(2 pt)



(2 pt)

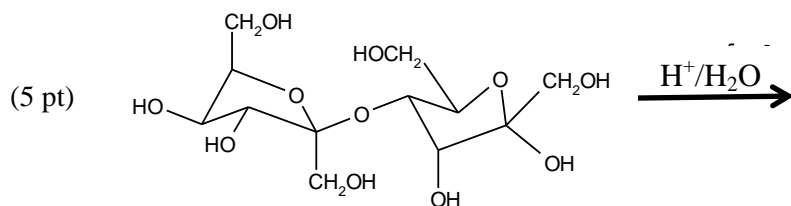


(3 pt)



A condensation reaction: Draw the structure of a disaccharide with a  $[\beta\text{-}1,2]$  glycoside bond

17 pt



23. In biochemical reactions  $\text{NAD}^+$  and  $\text{NADH}$  are often involved in what kind of reaction?

- A) oxidation    B) reduction    C) condensation    D) hydrolysis    E) oxidation and reduction

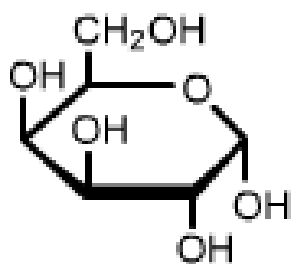
**Section 6.5 & 6.6 Disaccharides and Polysaccharides**

Match each term on the right with the description below. *An answer may be used more than once.*

24. A carbohydrate that cannot be digested by humans	A) sucrose
25. A disaccharide with an $[\alpha\text{-}1,4]$ glycoside bond derived from starch	B) glycogen
26. A carbohydrate that stores energy in the human body	C) D-galactose
27. A carbohydrate that is used to build cell walls in plants	D) maltose
28. A monosaccharide that combines with glucose to form lactose	E) D-glucose
29. A disaccharide found in milk and milk products	AB) cellulose
30. A disaccharide consisting of D-glucose and D-fructose with a $[\beta\text{-}2,\alpha\text{-}1]$ glycoside bond	AC) D-fructose
31. A monosaccharide found in fruit juices and honey, the sweetest carbohydrate	AD) lactose
32. An unbranched carbohydrate that stores glucose in plants	AE) amylose
33. The product when maltose is hydrolyzed	

(6 bonus points)

In the following Haworth structure circle and identify the hemiacetal functional group, the anomeric carbon atom and draw the Fisher Projection.



27 pt