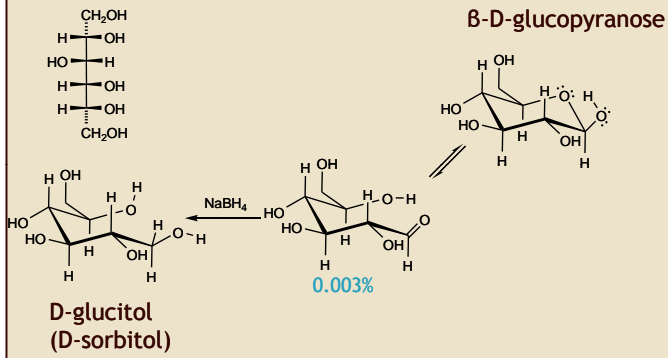
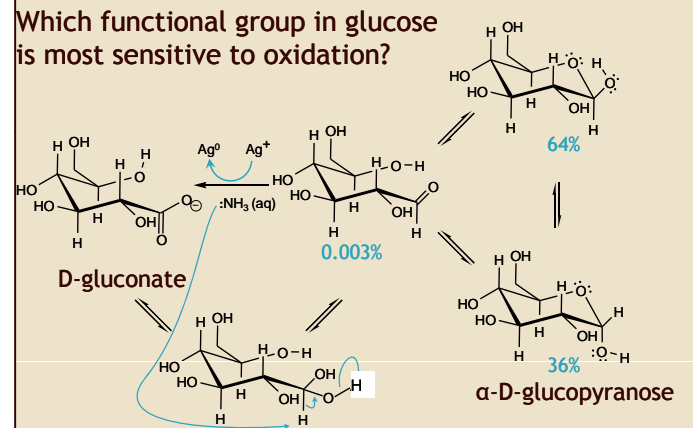


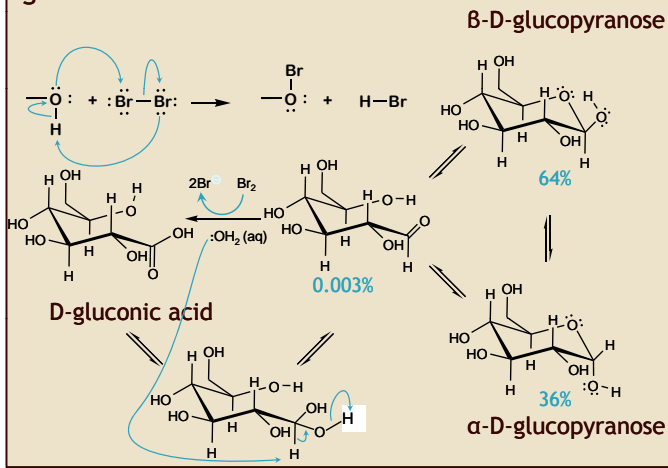
What happens when glucose is treated with  $\text{NaBH}_4$ ?



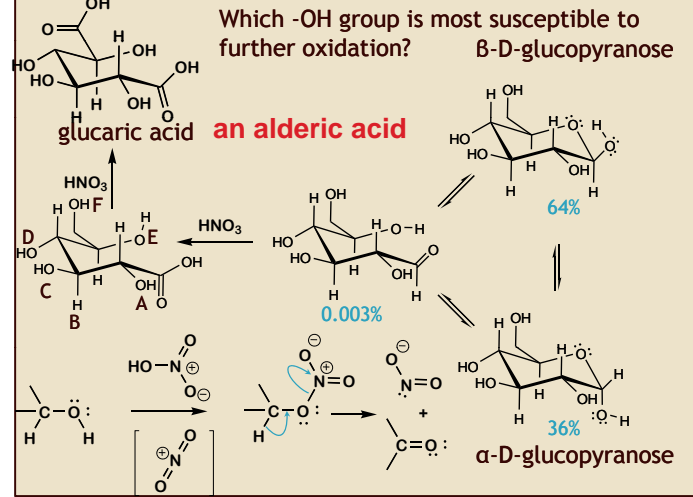
What happens when glucose is treated with oxidizing agents?



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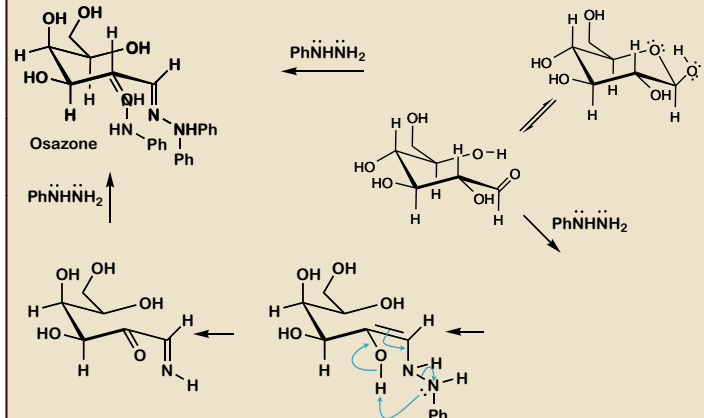


Nitric acid performs further oxidation on glucose.

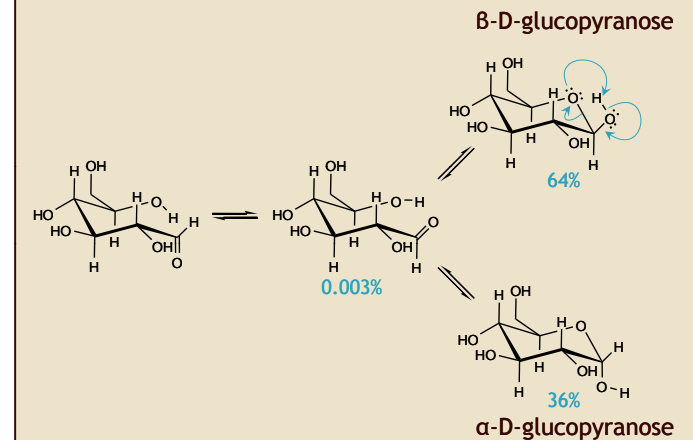


An important reaction in the development of carbohydrate chemistry is their reaction with phenyl hydrazine.

What is the product of this reaction?

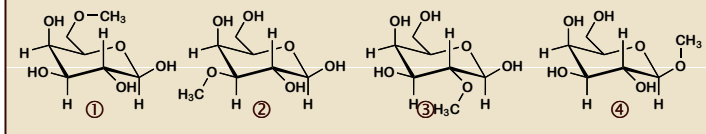


Review: Mutarotation

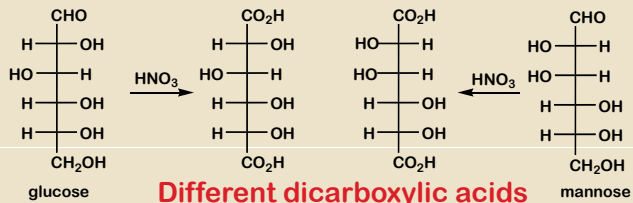
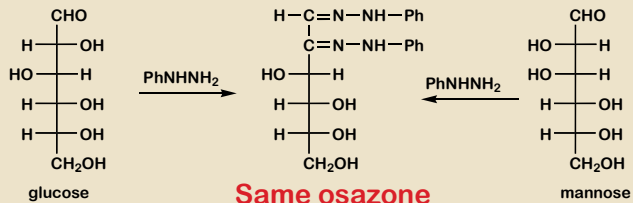


Review: Which of the following methyl ethers of glucose will not undergo mutarotation?

A = none B = ① C = ② D = ③ E = ④ F = all

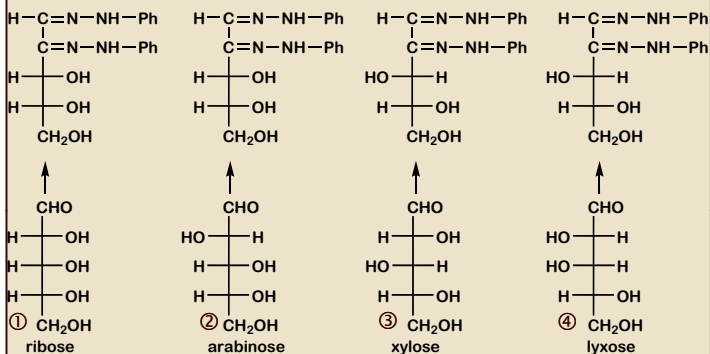


Review: Reactions of carbohydrates.



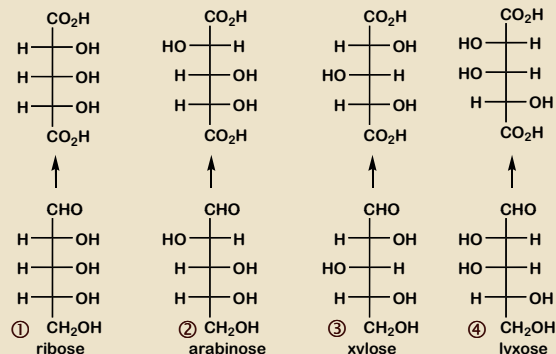
Which of the following pentoses pairs give the same **Osazone** on treatment with phenylhydrazine?

A = none B = ①+② C = ①+③ D = ②+④ E = ①+④



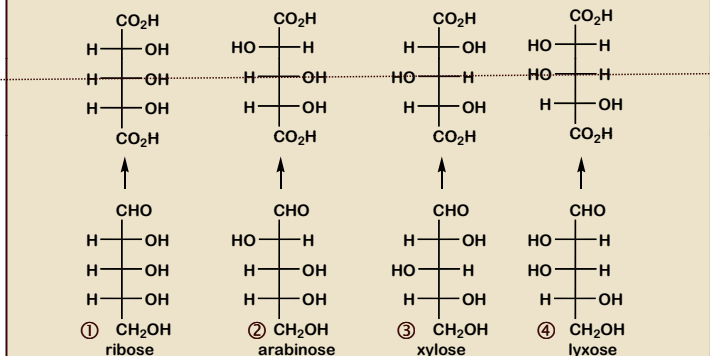
Which of the following pentoses give the same **aldaric acid** on treatment with nitric acid?

A = none B = ①+② C = ①+③ D = ②+④ E = ①+④ F = all

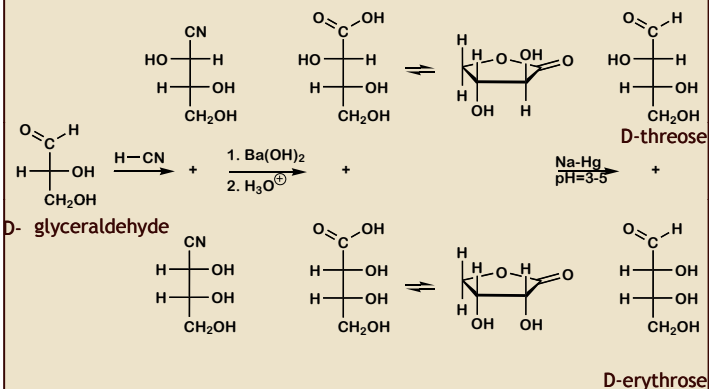


Which of the following pentoses give an **achiral aldaric acid** on treatment with nitric acid?

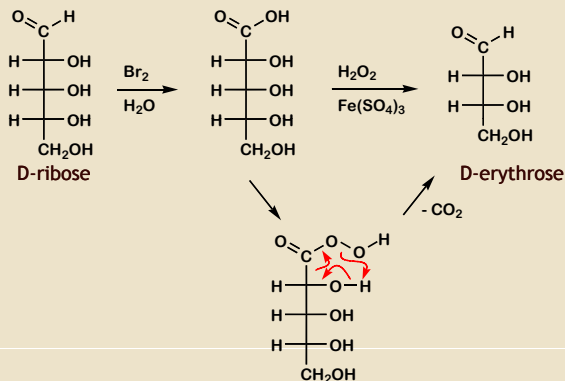
A = none B = ①+② C = ①+③ D = ②+④ E = ①+④ F = all



Kiliani- Fischer synthesis of monosaccharides.



### The Ruff degradation.



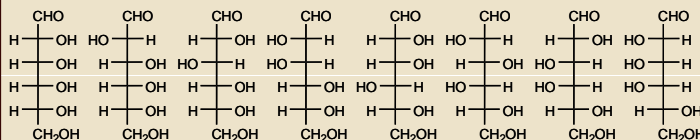
### The Fischer structure proof of glucose.



1888 (12 years after tetrahedral carbon)

tools available: optical rotations, melting points, a few chemical reactions

what was known: glucose was an aldohexose with 4 stereocenters

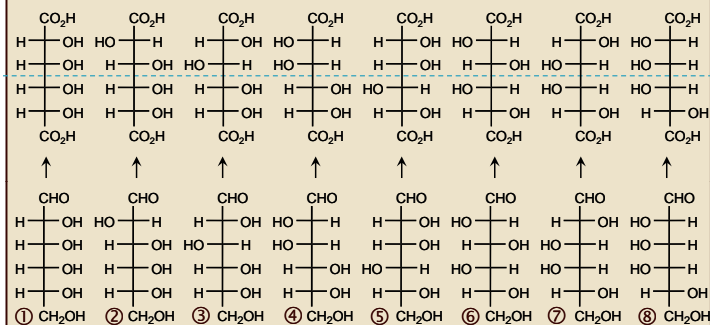


### Which of the following cannot be glucose?

1. The oxidation of glucose gives an optically active glucaric acid.

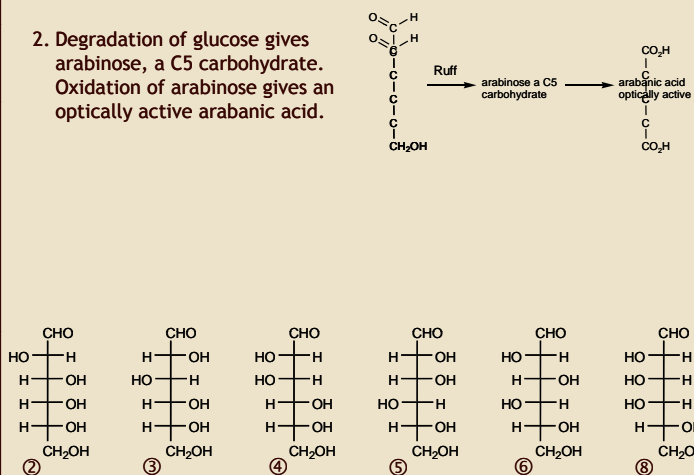
A = none B = ①+② C = ②+③ D = ④+⑧

E = ⑤+⑦ F = ②+⑥ G = ①+⑦ H = ⑦+⑧



### Which of the following cannot be glucose?

2. Degradation of glucose gives arabinose, a C5 carbohydrate. Oxidation of arabinose gives an optically active arabanic acid.



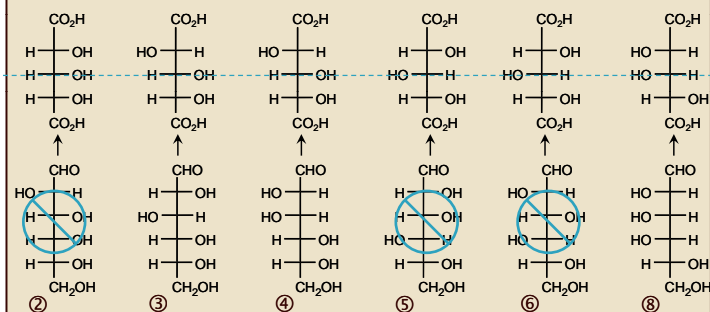
### Which of the following cannot be glucose?

2. Degradation of glucose gives arabinose, a C5 carbohydrate. Oxidation of arabinose gives an optically active arabanic acid.

A = ② + ⑤ + ⑥ B = ④ + ③ + ⑧

C = ④ + ⑧ + ⑥ D = ④ + ⑧ + ③

E = ⑥ + ⑦ + ③ F = ④ + ⑤ + ⑥



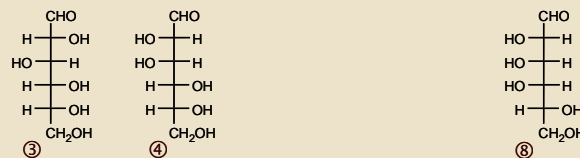
### Which of the following cannot be glucose?

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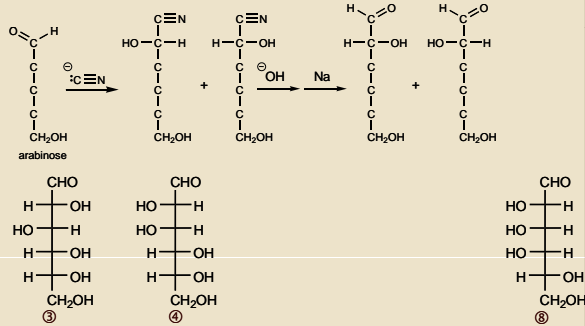
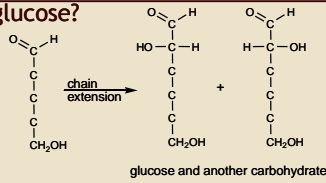
C = ④ + ⑧ + ⑥ D = ④ + ⑧ + ③

E = ⑥ + ⑦ + ③ F = ④ + ⑤ + ⑥



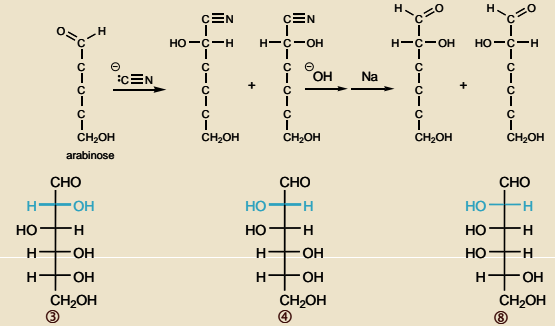
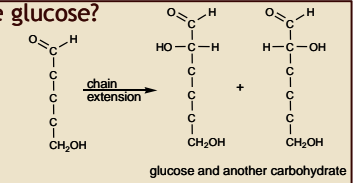
Which of the following cannot be glucose?

3. Chain extension of arabinose gives glucose and another carbohydrate.



Which of the following cannot be glucose?

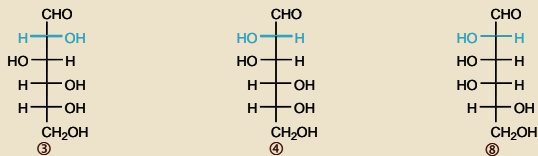
3. Chain extension of arabinose gives glucose and another carbohydrate still on the list.



Which of the following cannot be glucose?

3. Chain extension of arabinose gives glucose and another carbohydrate still on the list.

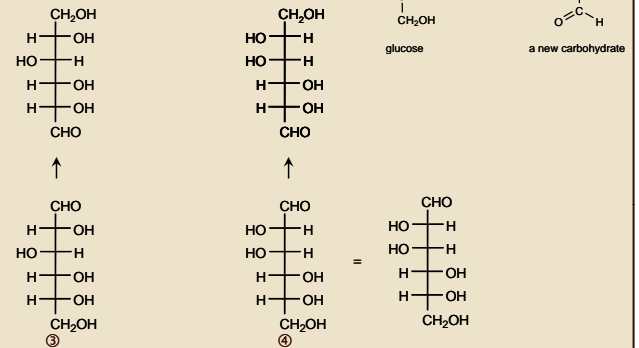
A = ④                      B = ⑧  
C = ④ + ③                D = ⑧ + ③  
E = ③                        F = ④ + ⑧



Which of the following cannot be glucose?

4. The interchange of the end functional groups give a *new* aldohexose, L-gulose.

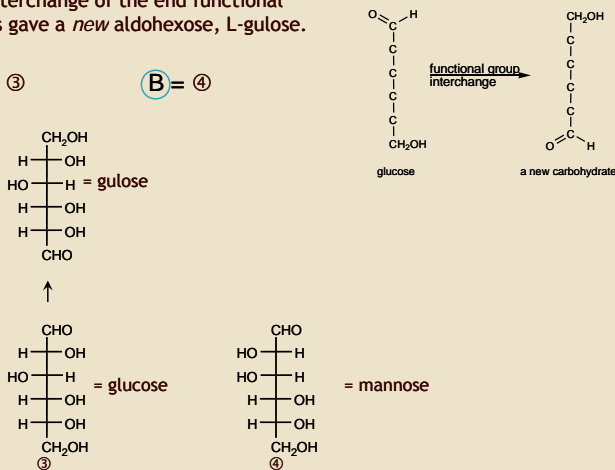
A = ③                      B = ④



Which of the following cannot be glucose?

4. The interchange of the end functional groups give a *new* aldohexose, L-gulose.

A = ③                      B = ④



Treatment of D-aldohexoses X and Y with  $\text{NaBH}_4$  gave the same optically active alditol. Give possible structures for X and Y.

not chiral                      A = ① + ②                      B = ⑦ + ③  
C = ④ + ⑦                      D = ④ + ⑧  
E = ② + ⑧                      F = ⑦ + ⑤

