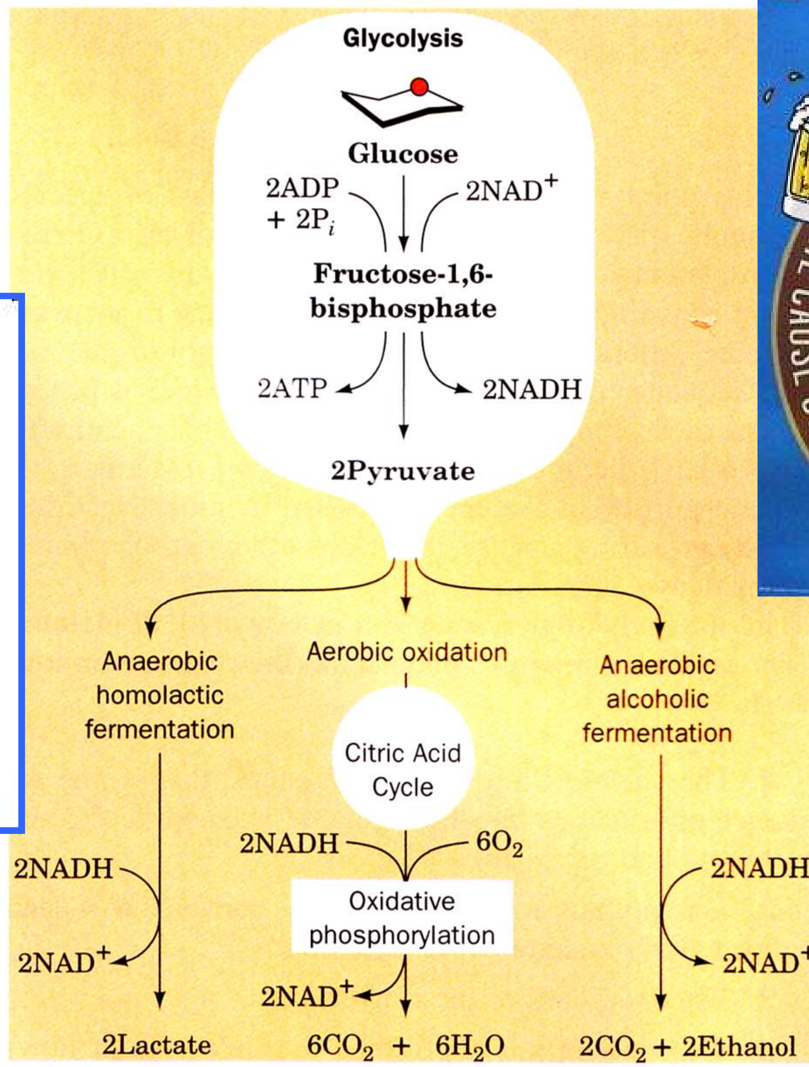
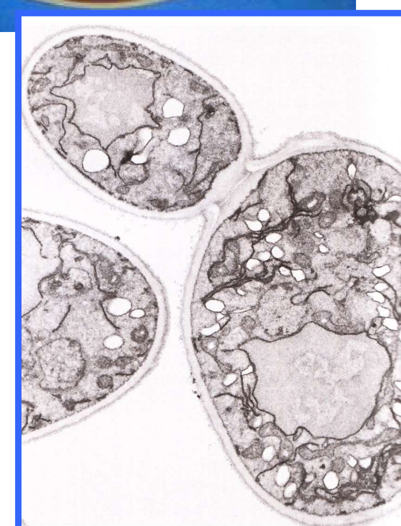
Glycolysis

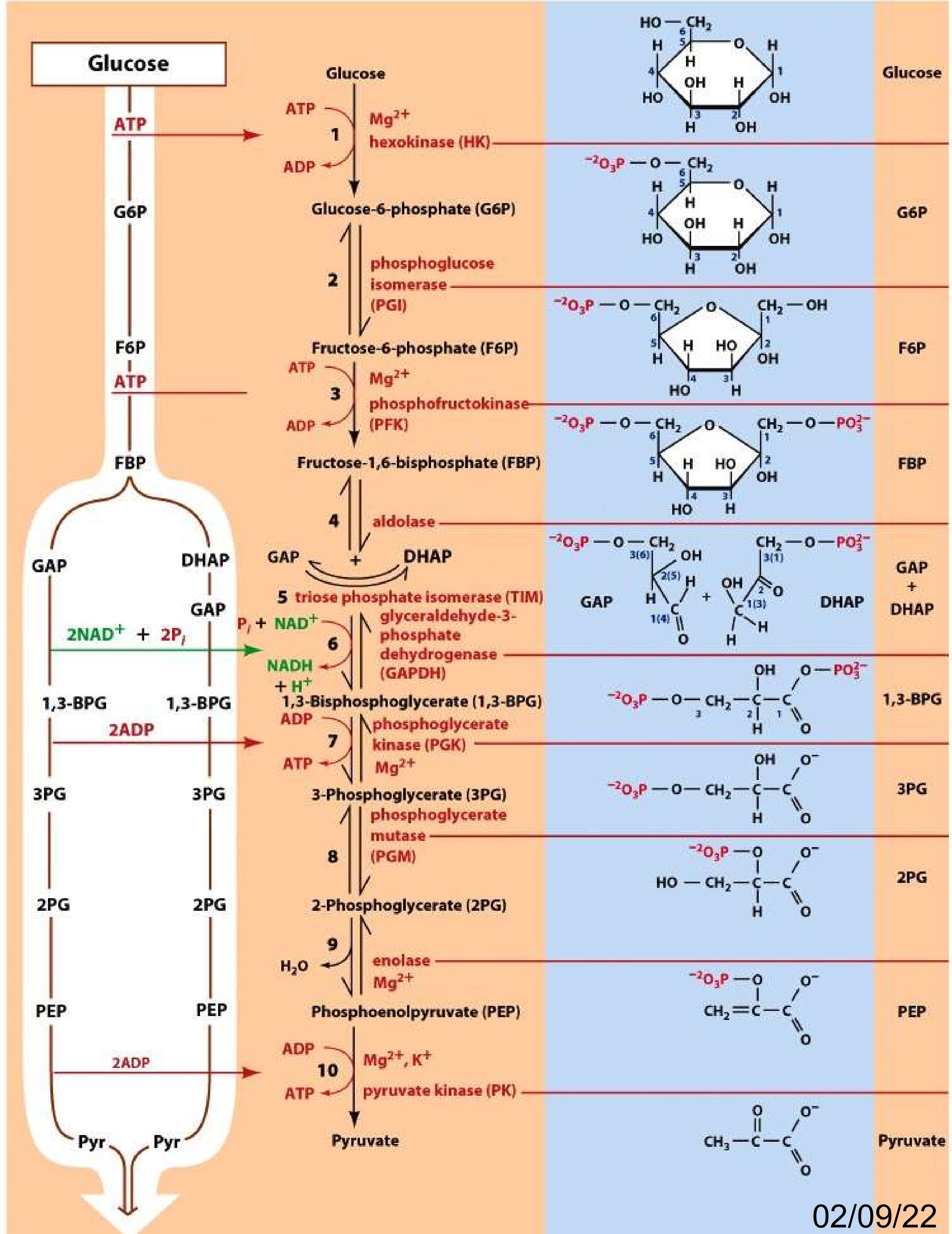
Voet & Voet, Chapter 17

(*glykos*, sweet; *lysis*, loosening)

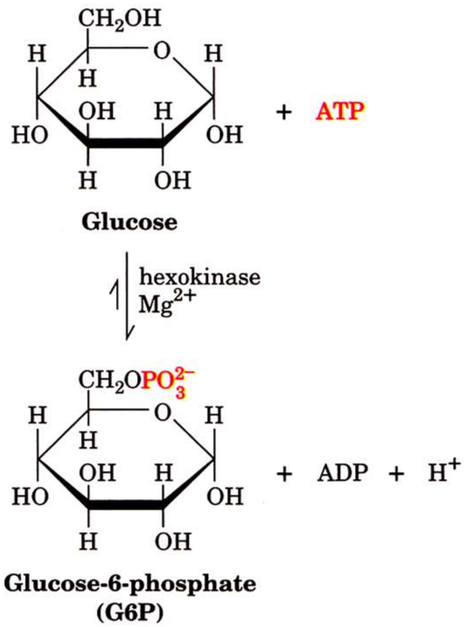


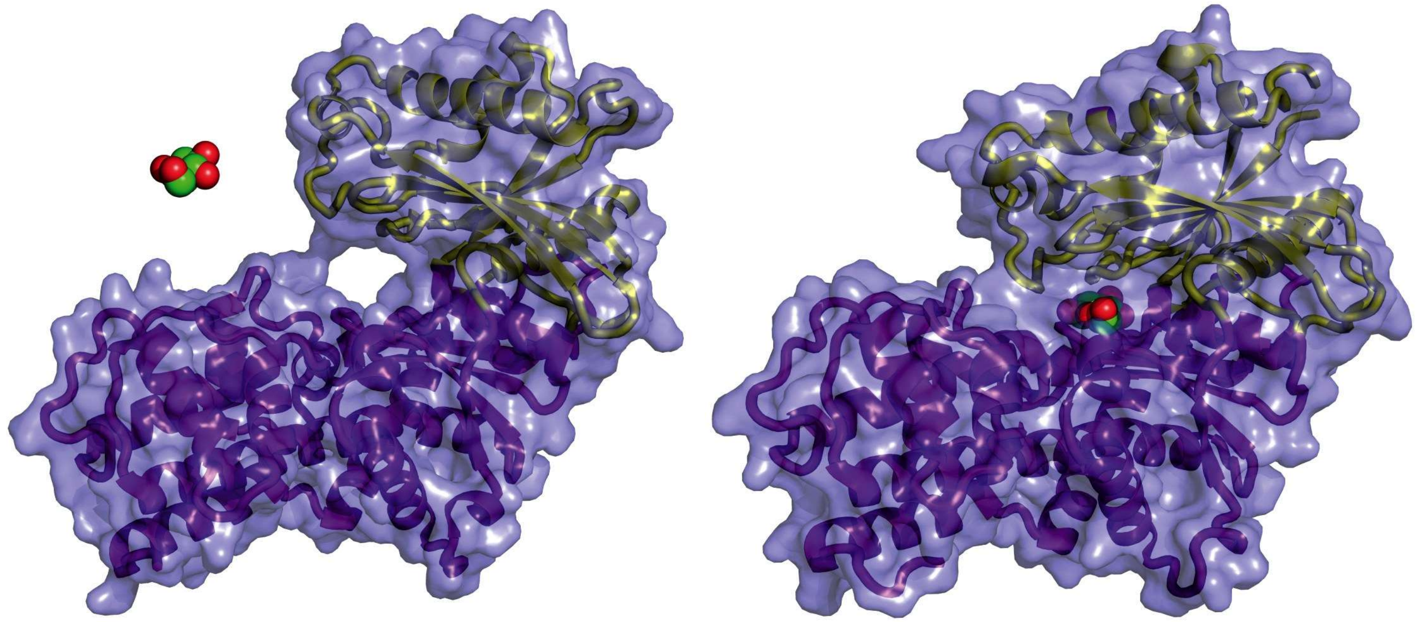


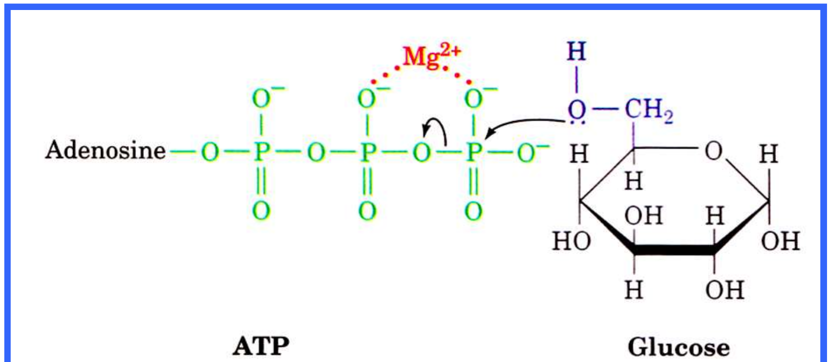
More shock and awe: Overview



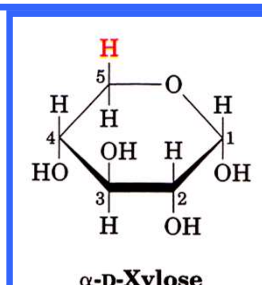
Step 1: Hexokinase employs ATP to make the first step irreversible and trap glucose



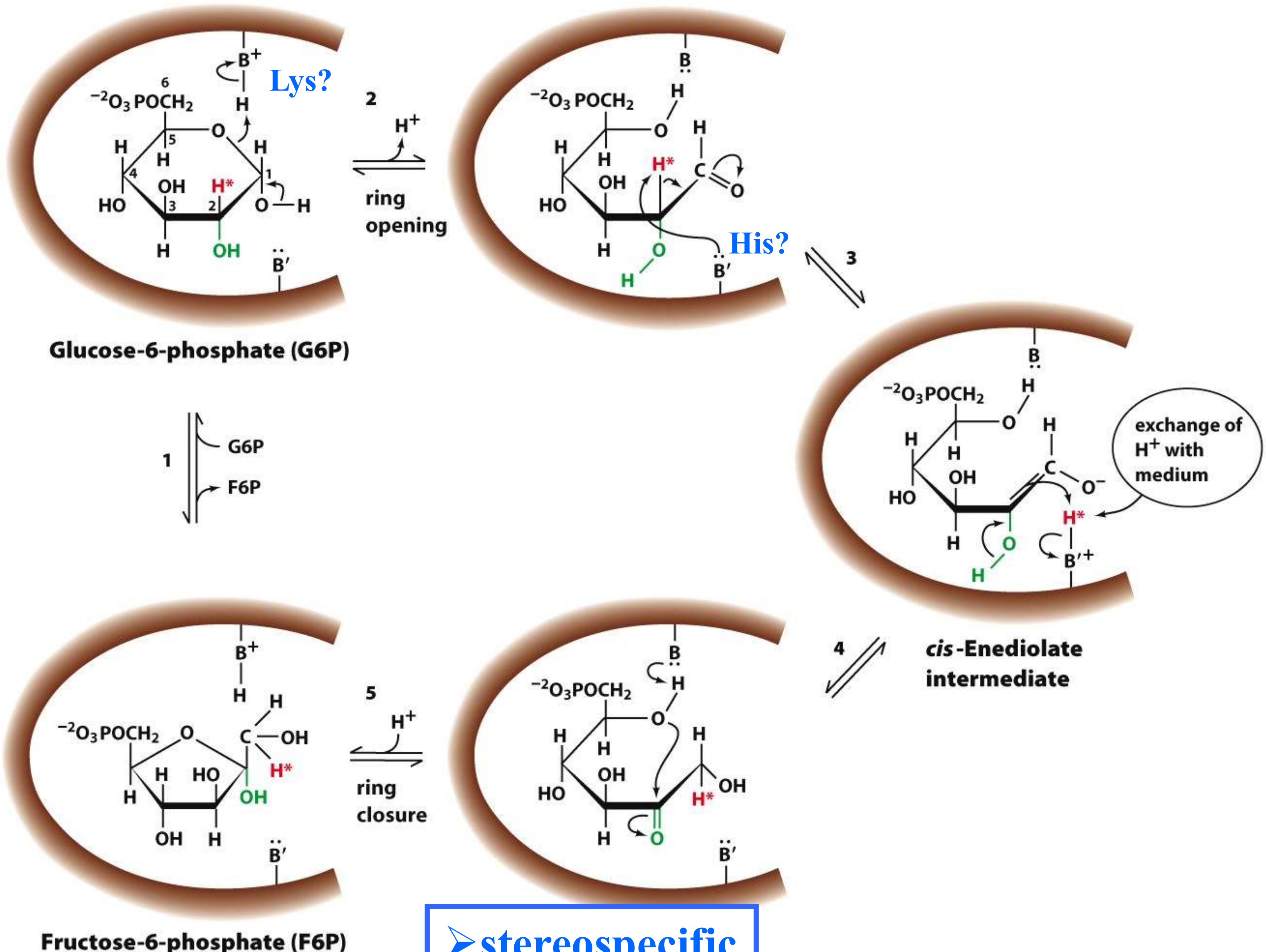




- ➢decoy leads to ATP hydrolysis



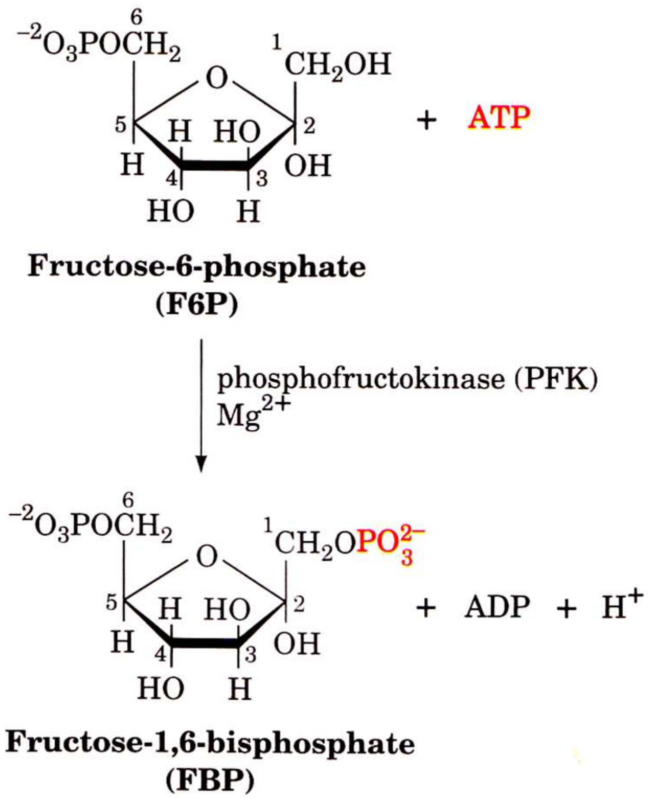
Step 2: Phosphoglucose isomerase



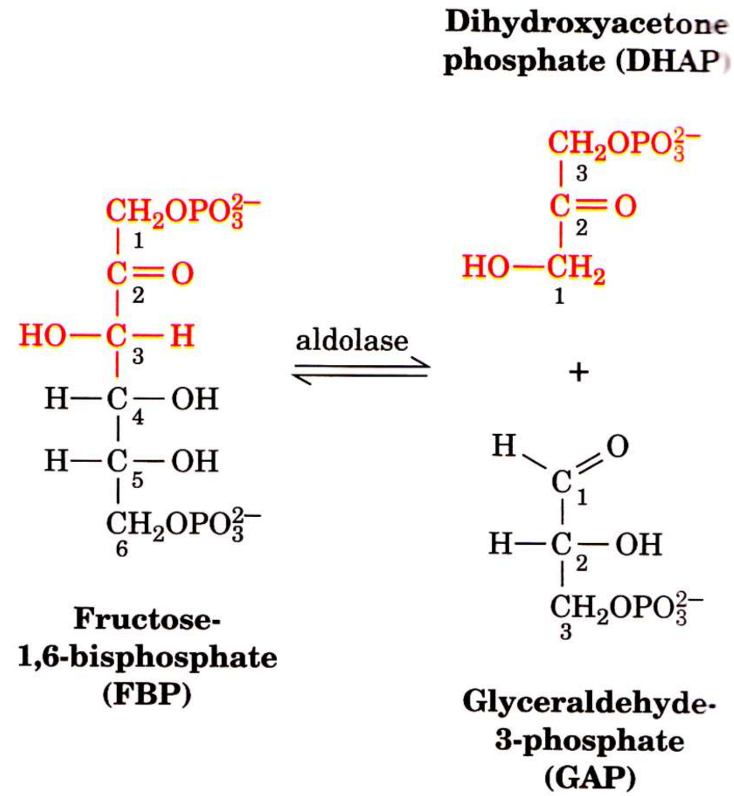
➤stereospecific

Steps 3 & 4: Phosphofructokinase and Aldolase

Phosphofructokinase



Aldolase

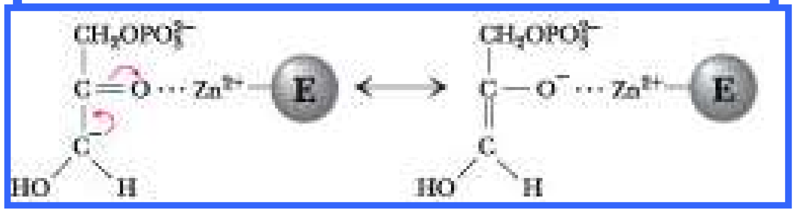


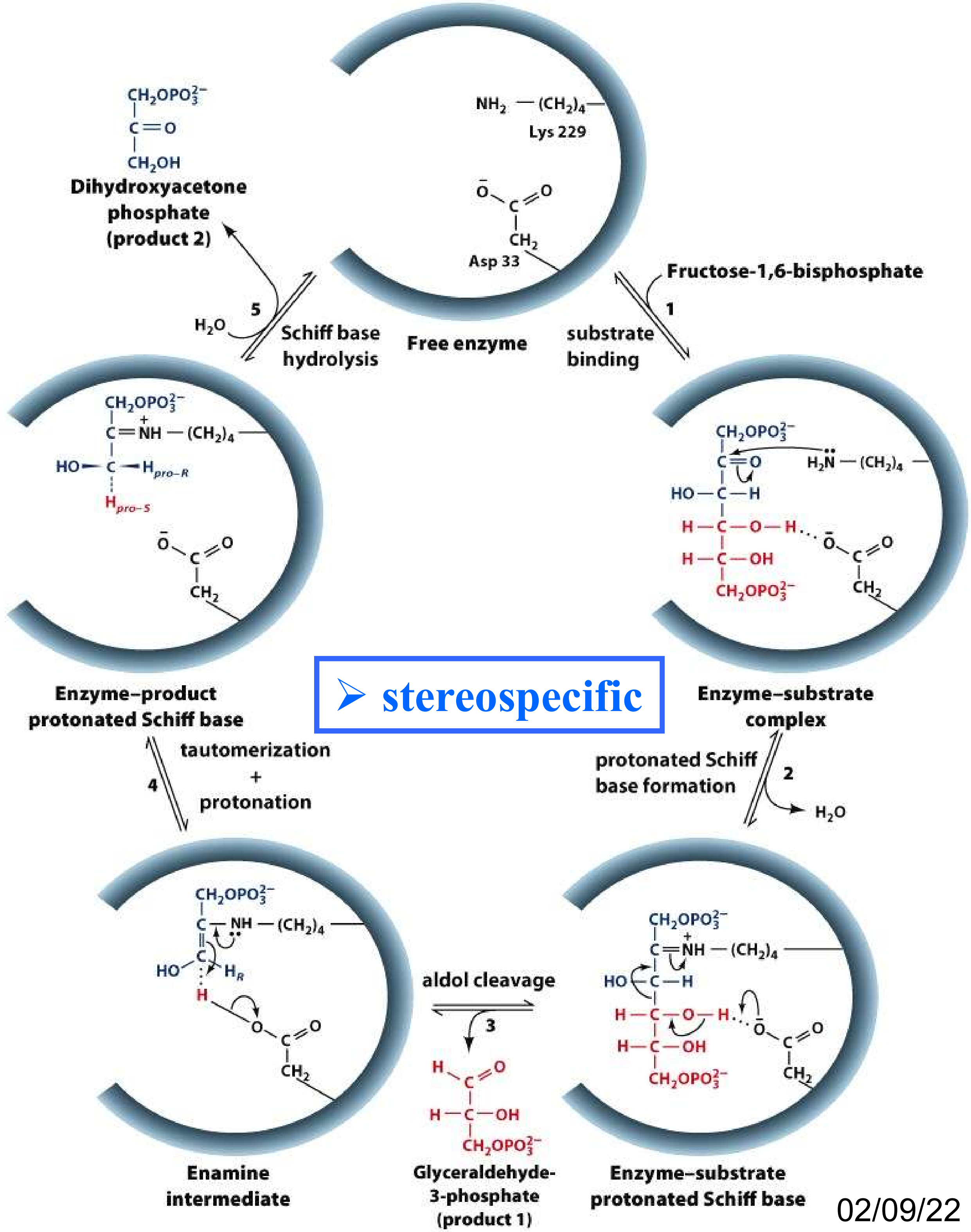
- ➢Installs a second phosphate
- ➢Provides a second "irreversible", rate-limiting, controllable step
- ➢Generates a near-symmetric bisphosphate

- ➢Starts the breakdown by aldol cleavage (= retro aldol condensation)
- ➢Generates two isomeric (interconvertible) C3 compounds

Class I aldolase: A Schiff base stabilizes the carbanion

Class II aldolases (in fungi, algae and some bacteria) use Zn^{2+} or Fe^{2+} instead

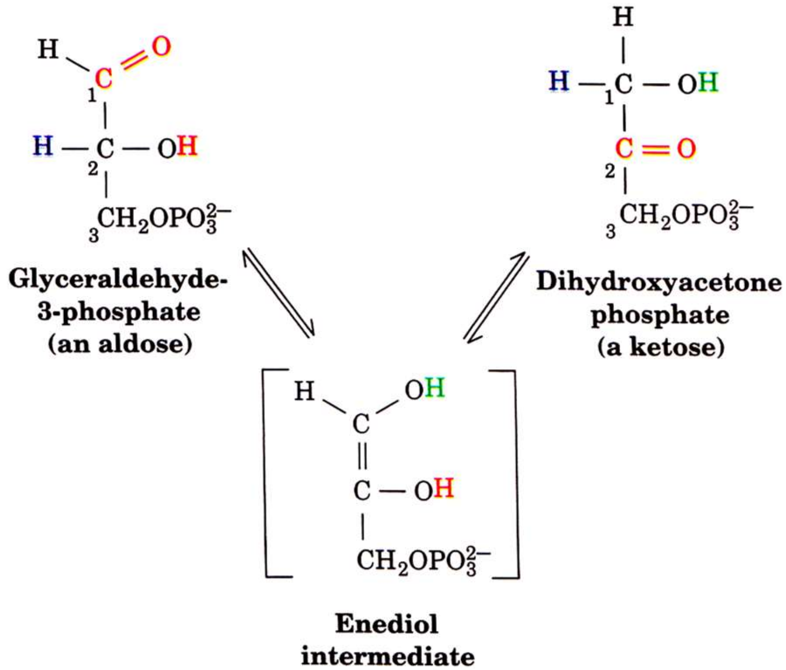




➢ stereospecific

Step 5: Triose phosphate isomerase (TIM)

Goal:



Mechanism