Chemistry of Natural Products
(CHEM-479)

Online Lectures (Vitamins)

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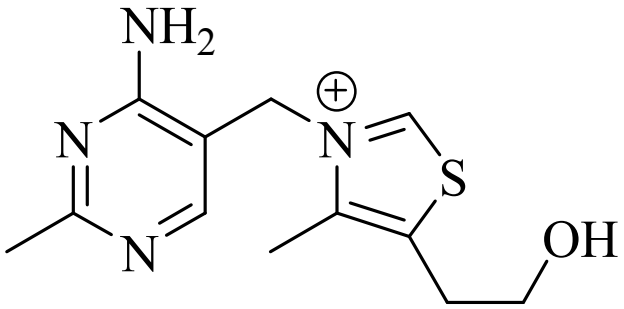
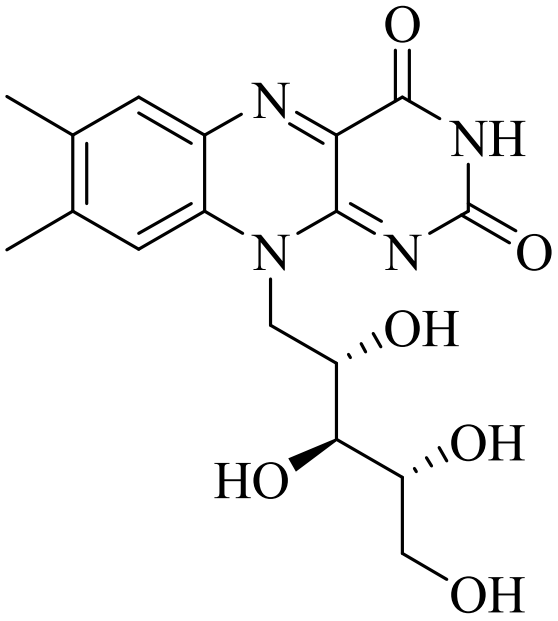
Classification of Vitamin-B

1. Vitamin B_1 (Thiamine)
2. Vitamin B_2 (Riboflavine)
3. Vitamin B_3 (Vitamin P / Niacin [Nicotinic acid + Nicotinamide])
4. Vitamin B_5 (Pantothanic acid)
5. Vitamin B_6 (Pyridoxine)
6. Vitamin B_7 (Vitamin-H / Biotin)
7. Vitamin B_9 (Vitamin M / Folic acid)
8. Vitamin B_{12} (Coblamine)
9. Vitamin B_8 (Myo-inositol)

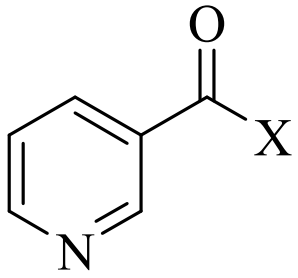
Vitamin-B



Vitamin B_1 (Thiamine)



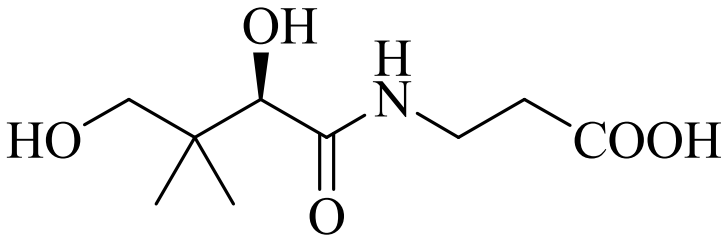
Vitamin B_2 (Riboflavin)



Vitamin B_3

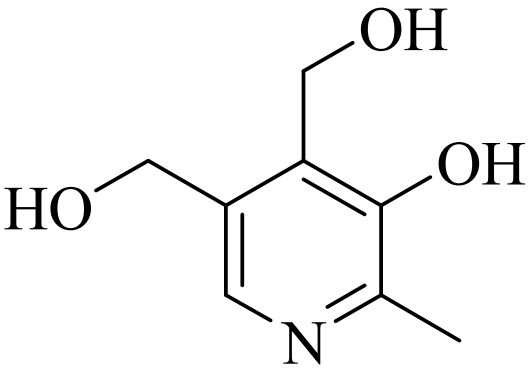
X = OH Nicotinic acid

X = NH_2 Nicotinamide

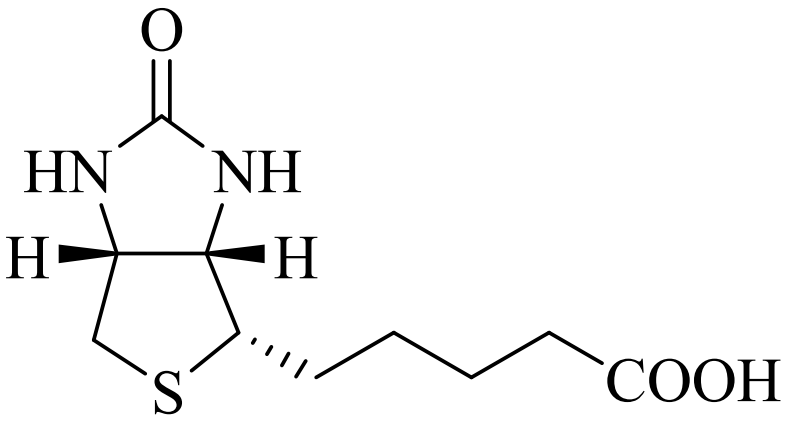


Vitamin B_5 (Pantothanic acid)

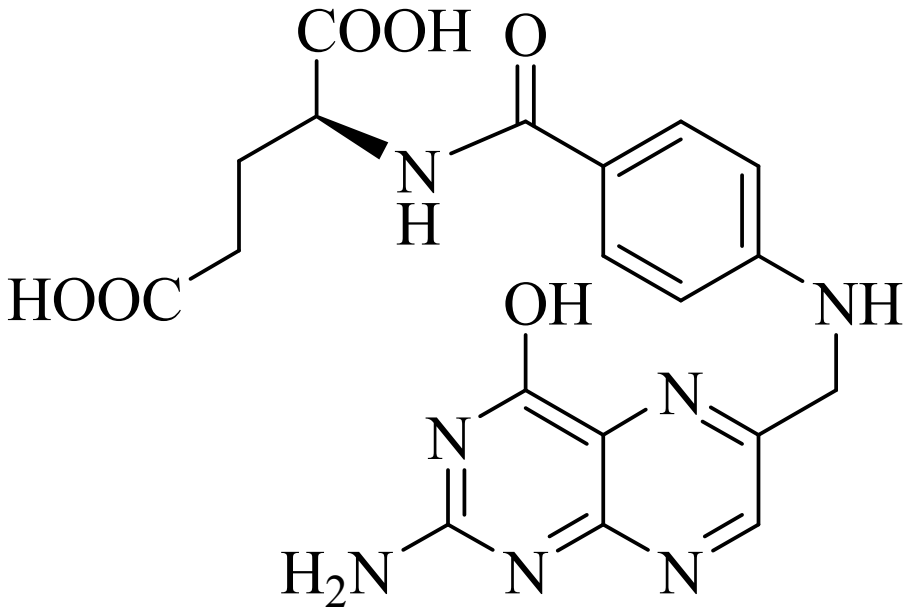
Vitamin-B



Vitamin B_6 Pyridoxine



Vitamin B_7 (Biotin)



Vitamin B_9 (Folic acid)

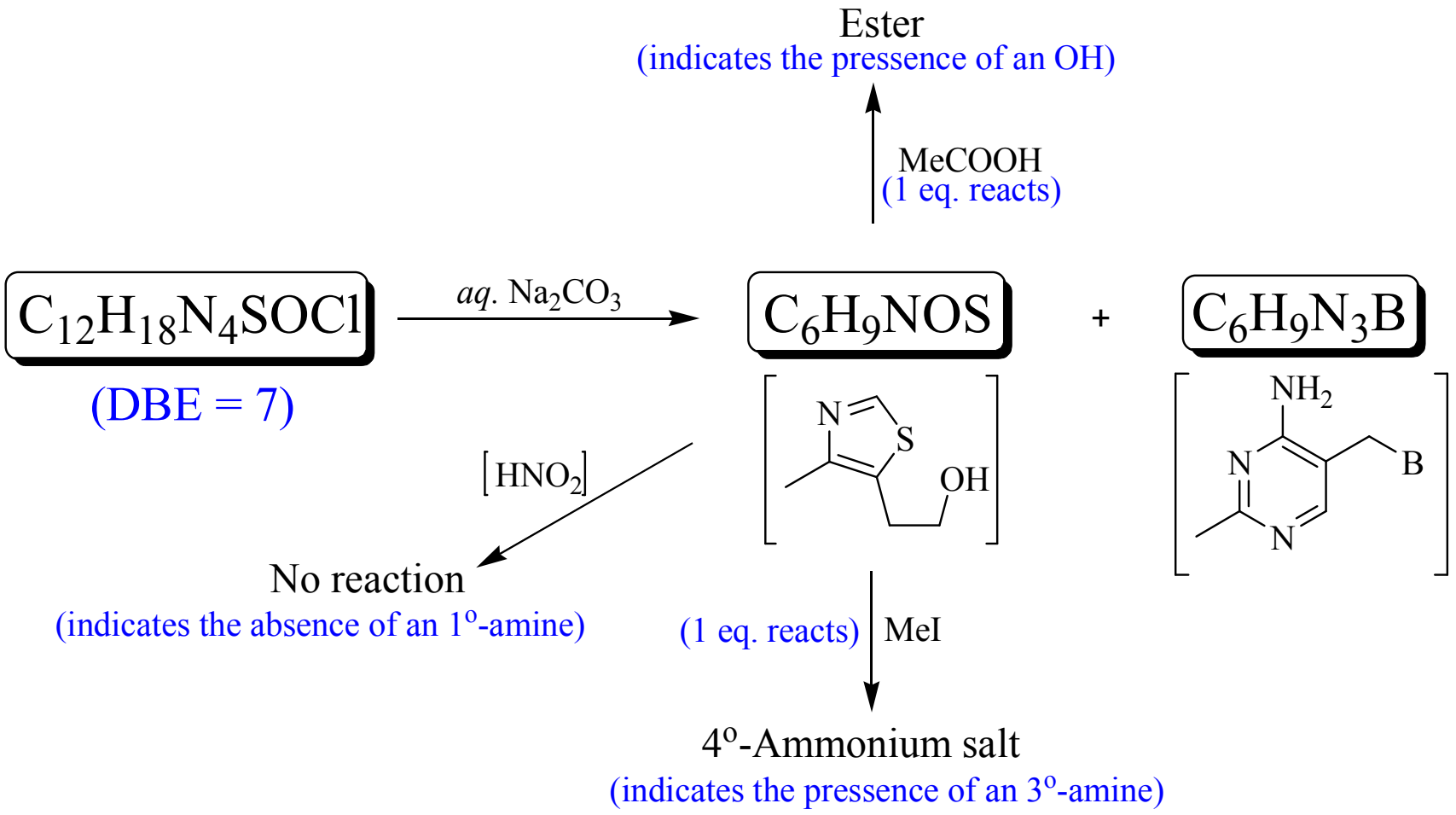
Vitamin-B Complexes

Vitamin	RDA	Sources	Function	Deficiency
B_1	1.5 mg	Soft tissues (liver, kidney, heart), egg, leafy green vegetables, nuts	Catalyses carbohydrate metabolism	Leg cramps Muscular cramps
B_2	1.3 mg	Mushrooms, milk, meat, liver, dark green vegetables	Metabolizes fats, carbohydrates & respiratory proteins	Skin lesions
B_3	16 mg	Chicken, fish (salman, tuna), liver, nuts	Releases energy from nutrients	Pellagra (sunburn and swollen gums) & mental confusion
B_5	10 mg	Egg, whole grain cereals, legumes	Metabolizes fats, carbohydrates & proteins	Fatigue, allergies

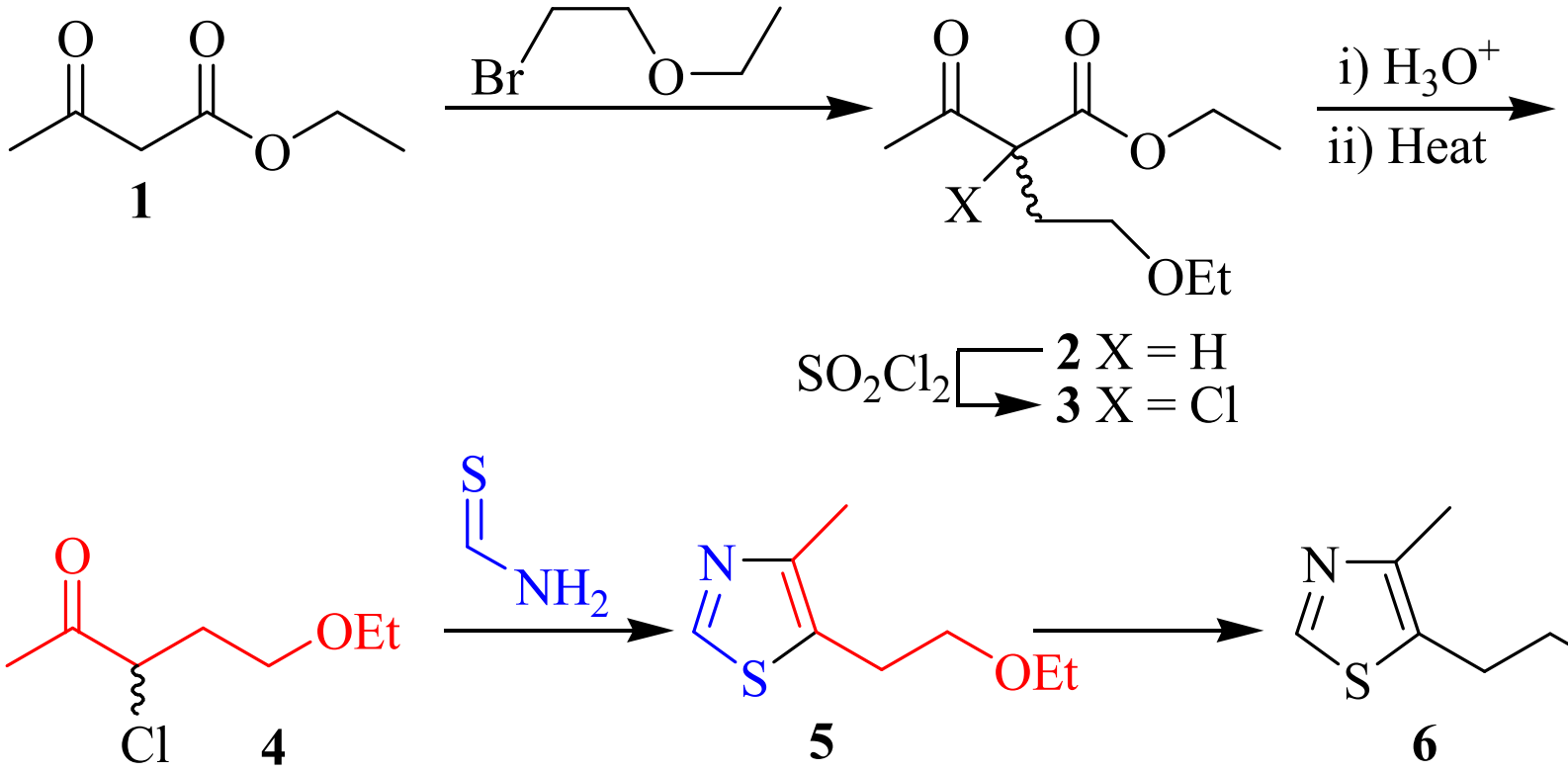
Vitamin-B Complexes

Vitamin	RDA	Sources	Function	Deficiency
B_6	1.6 mg	Whole grains, bread, liver, green beans, avocado, banana	Metabolizes amino acids, RBC	Skin disorders, anemia, convulsions
B_7	30 µg		Synthesis of fatty acids	Not reported
B_9	0.4 mg	dark green vegetables, nuts, whole grains	Synthesis of hemoglobin	Anemia
B_{12}	2.4 µg	Egg, milk, fish, meat, liver	Helps neuro-function, formation of RBC	Anemia

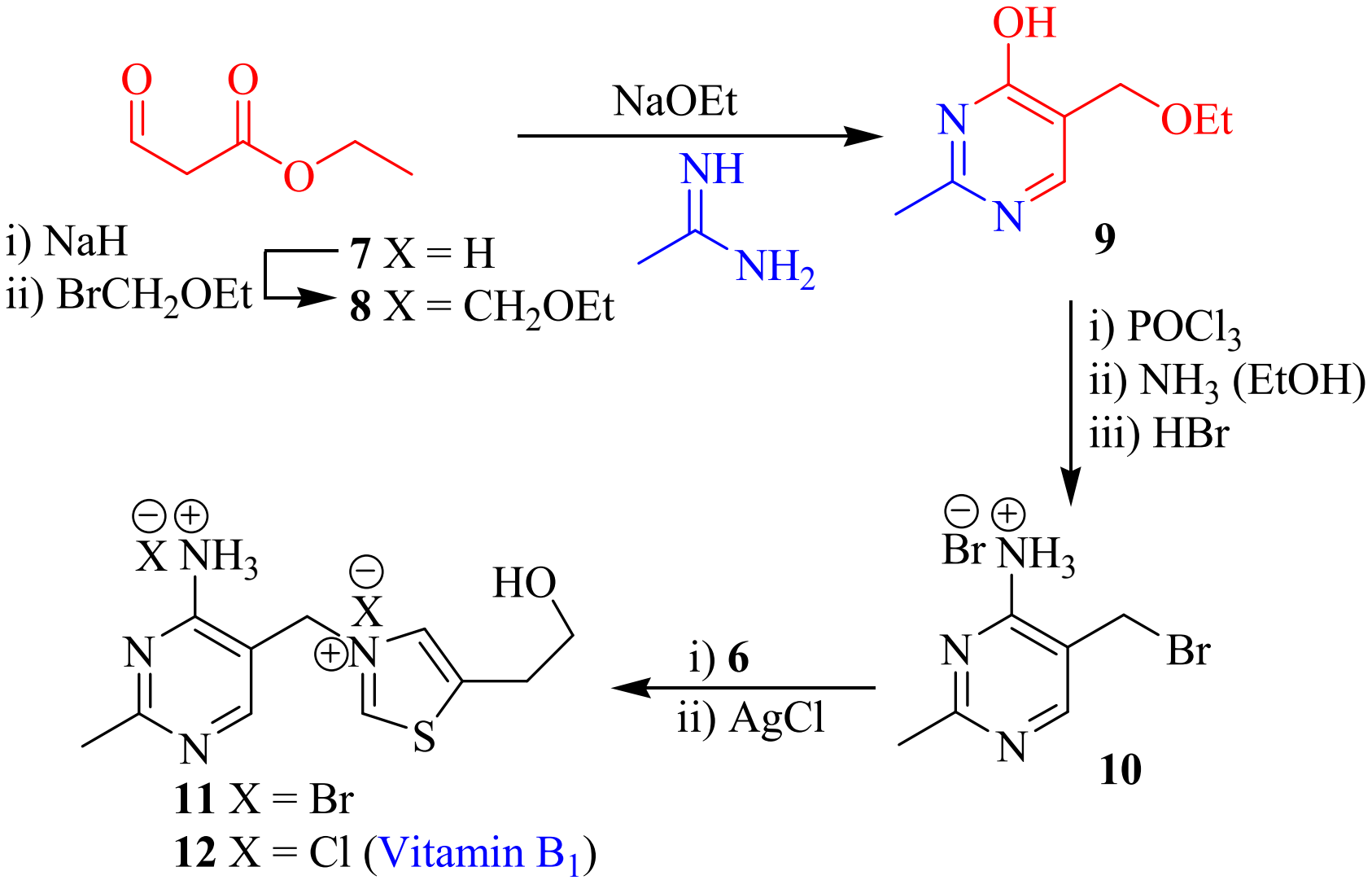
Chemical Method of Analyses (Vit-B_1)



Synthesis of Vitamin-B_1



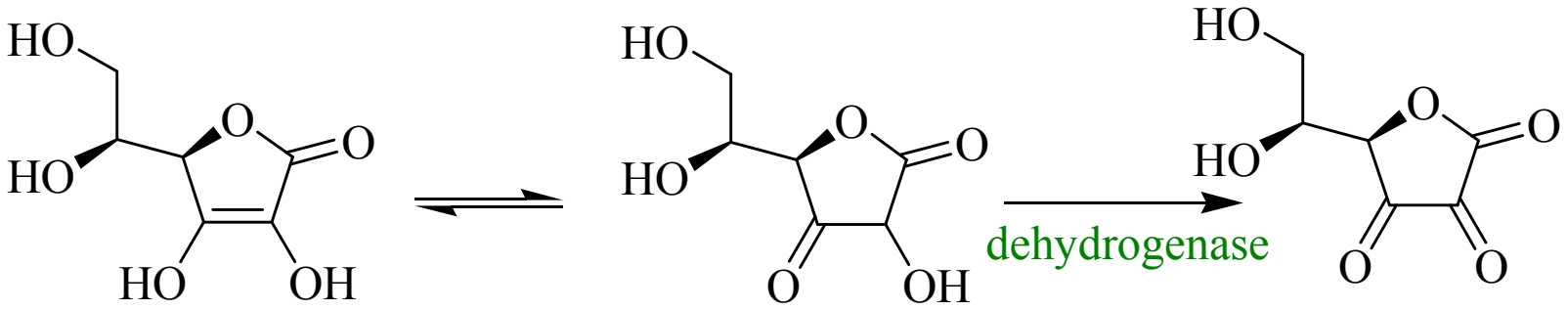
Synthesis of Vitamin-B_1



History of Vitamin-C

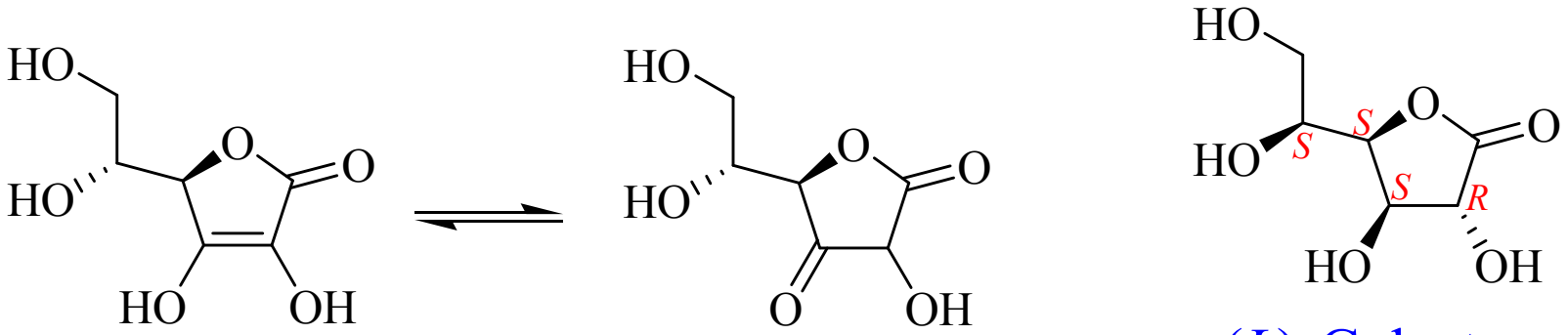
- Essential for higher primates, mammals (human, bat, guinea pig) and a few species of birds and fish
- Human does not produce Vit-C while other animals does
- Mammals carries out biosynthesis in liver and birds / reptiles do so in kidney
- Vit-C was isolated in 1933 and Nobel Prize in Medicine was awarded to Joseph Svirbely and GyÖrgy in 1937
- Vit-C was synthesized in laboratory by Sir Walter Norman Haworth and Sir Edmund Hirst and were awarded Nobel Prize in Chemistry in 1937
- Hoffmann-La Roche (Redoxon Chemicals) produced first industrial scale synthesis in 1954.

Vitamin-C



Enol tautomeric form Keto tautomeric form (*L*)-Dehydroascorbic acid

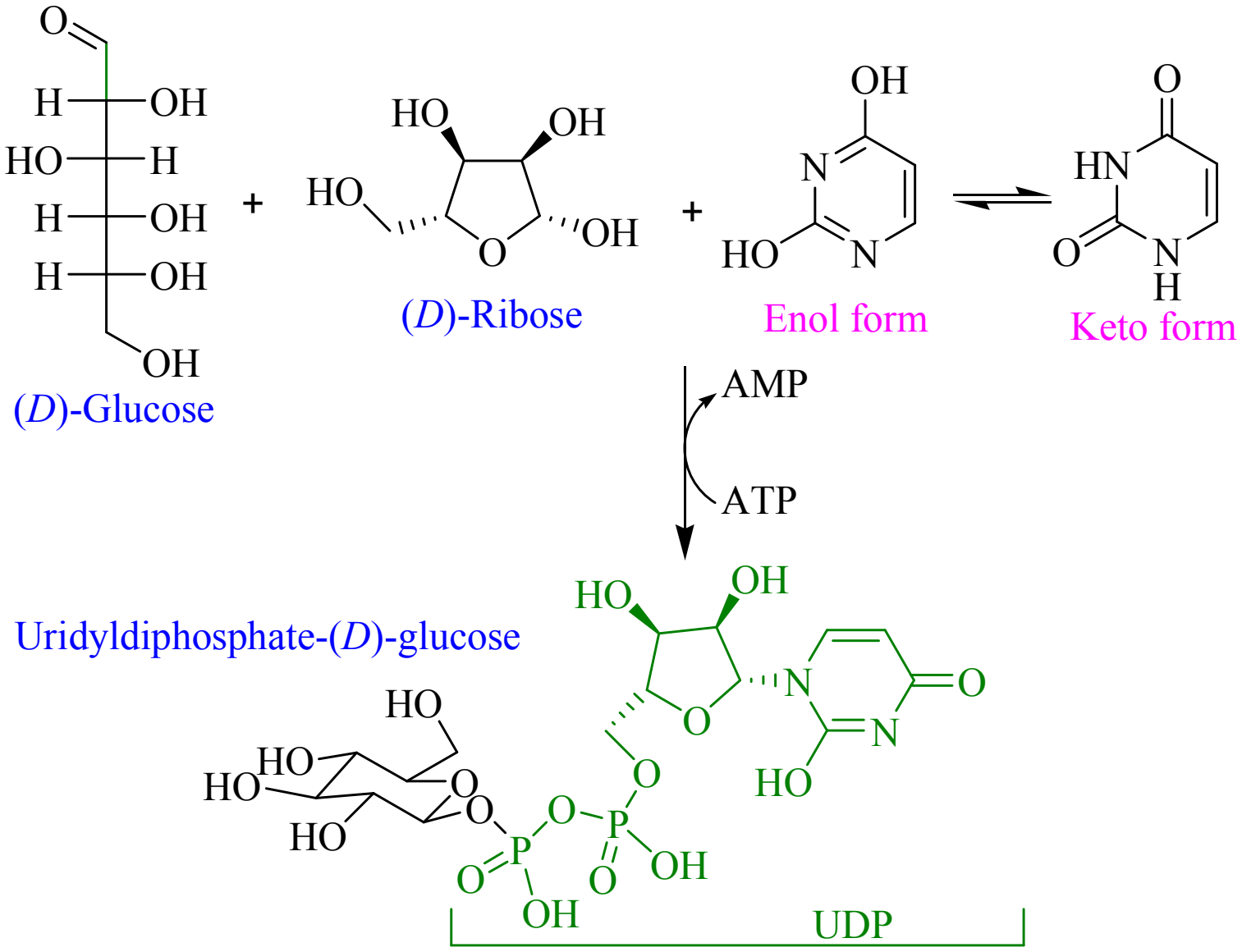
Vitamin C (*L*-Ascorbic acid)



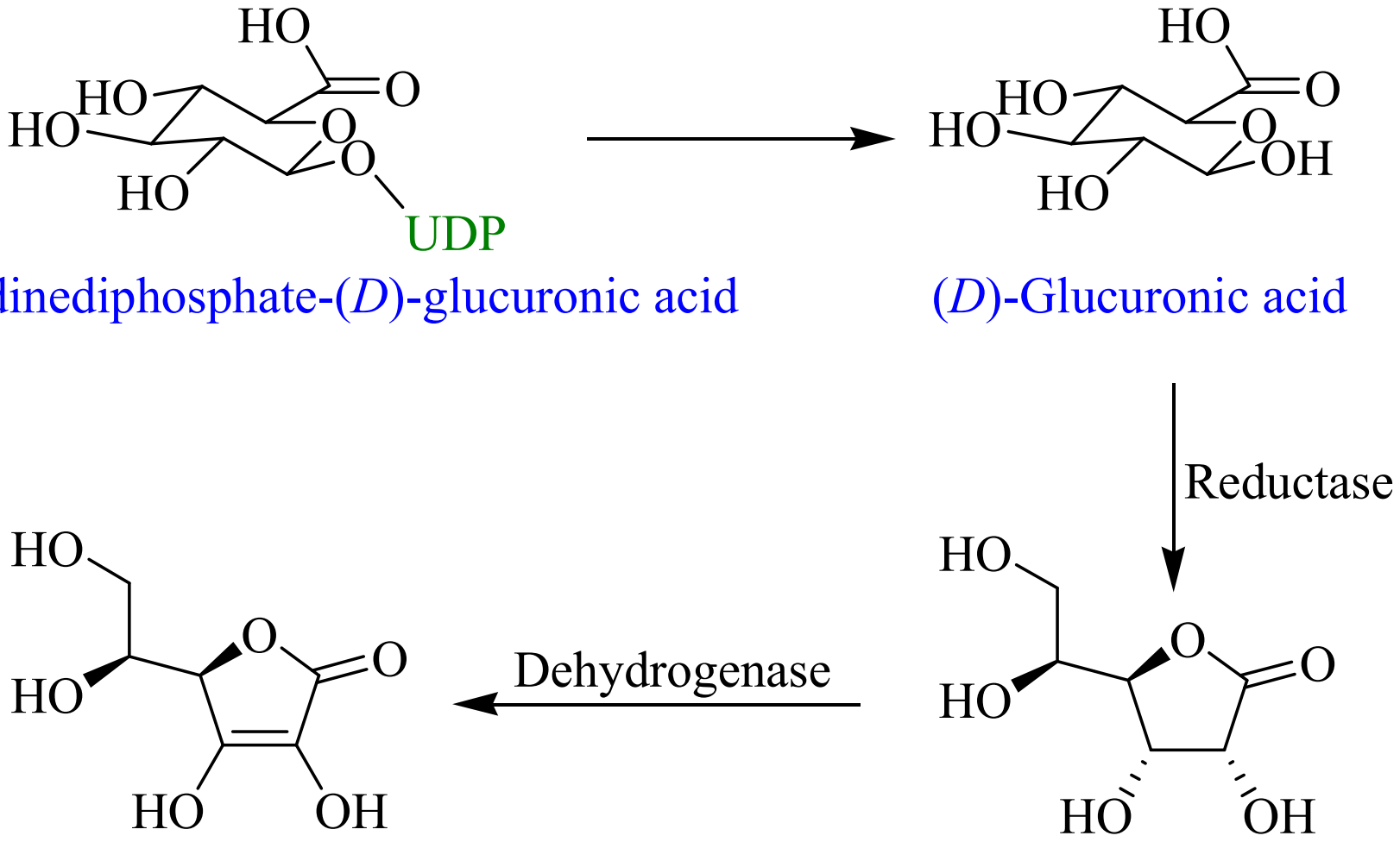
Enol tautomeric form Keto tautomeric form (*L*)-Galactose

(*D*)-Ascorbic acid)

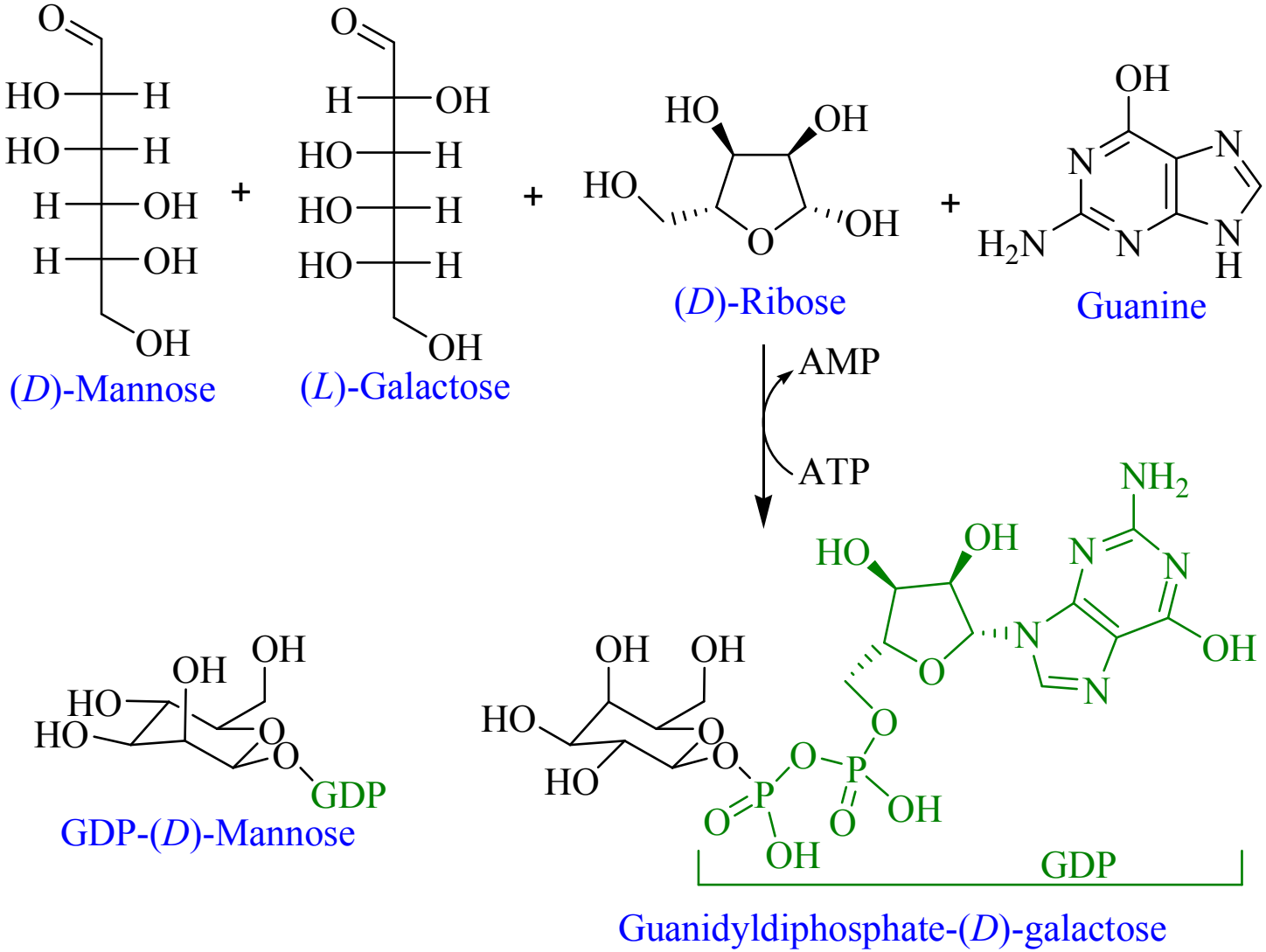
Biosynthesis of Vitamin-C in Mammals



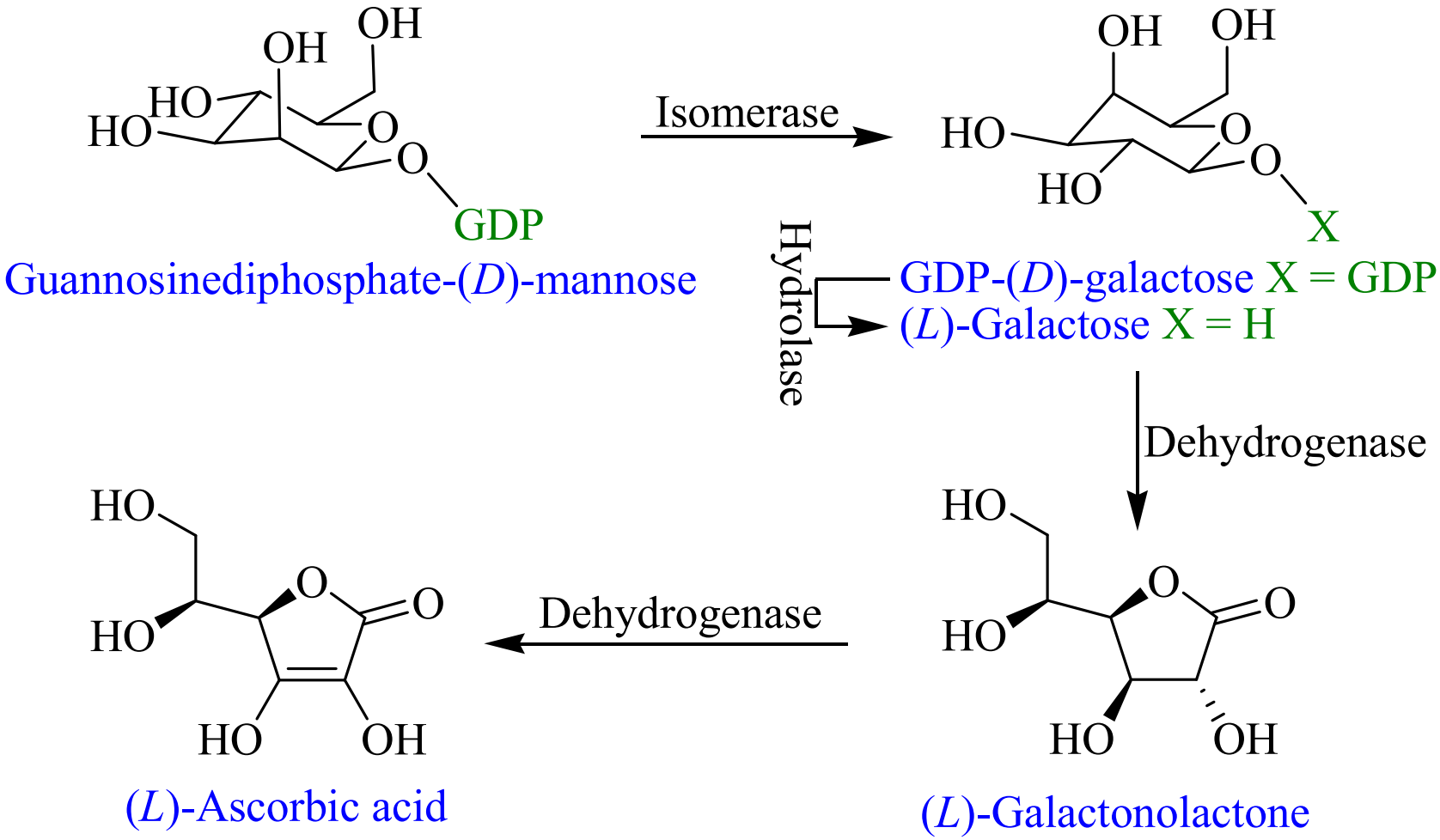
Biosynthesis of Vitamin-C in Mammals



Biosynthesis of Vitamin-C in Plants



Biosynthesis of Vitamin-C in Plants



RDA of Vitamin-C

RDA (Recommended Dietary Allowance) = 90 mg/day (100%)
40 mg/day (NHS, UK)
45 mg/day (WHO)
60 mg/day (Health Canada)
60-95 mg/day (FDA, USA)

	Food	**Dietary Value** (per 100 g)	**%age**
1	Kakadu plum	1,000-5,300 mg	1,100-5,889
2	Camu camu	2,800 mg	3,111
3	Green Pepper	244 mg	271
4	Guava	228 mg	253
5	Blackcurrant	200 mg	222
6	Red Pepper	190 mg	211
7	Lychee	70 mg	78
8	Papaya / Strawberry	60 µg	67
9	Orange / Lemon / Lime	53 mg	59
10	Pineapple / Cauliflower	48 mg	53