

FAT-SOLUBLE VITAMINS

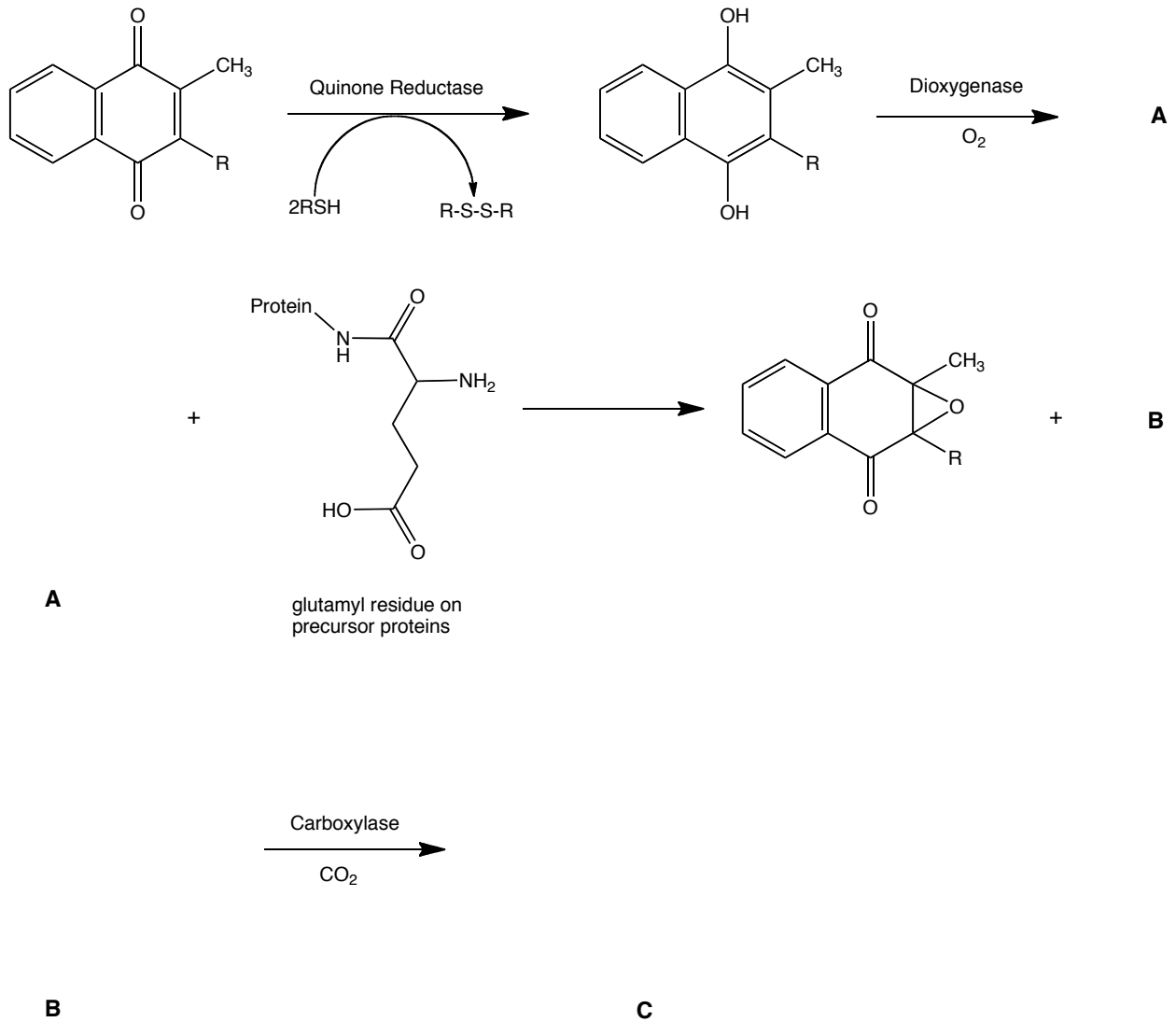
I. Complete the following table:

| Vitamin | Deficiency State | Toxicity | Uses | Daily Value |
|----------------|-------------------------|-----------------|-------------|--------------------|
| A | | | | |
| D | | | | |
| E | | | | |
| K | | | | |

II. Why is Vitamin E useful in patients that have hemolytic anemia associated with a glucose-6-phosphate dehydrogenase deficiency (G6PD)?

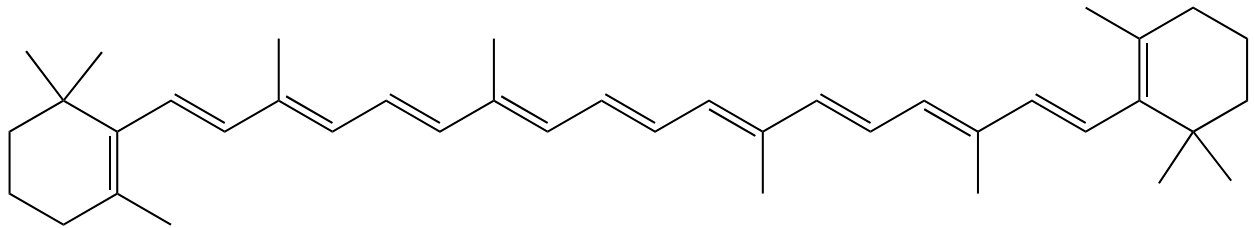
III. A patient has been on long-term broad-spectrum antibiotics for a year for Crohn's disease. Recently, there were signs of unexplained hemorrhage. What could be the reason for the bleeding?

IV. Complete the following equations that show Vitamin K involvement in the γ -carboxylation of precursor clotting factors. Give the structures of A, B, and C.



In the scheme above, draw an arrow at the step where a high dose of Vitamin E would block.

- V. Xerophthalmia or night blindness is one important deficiency state of which vitamin? Explain the relations.

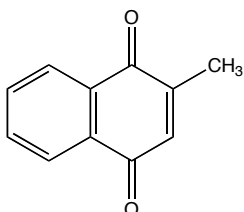


What is this structure? How can it help with night blindness?

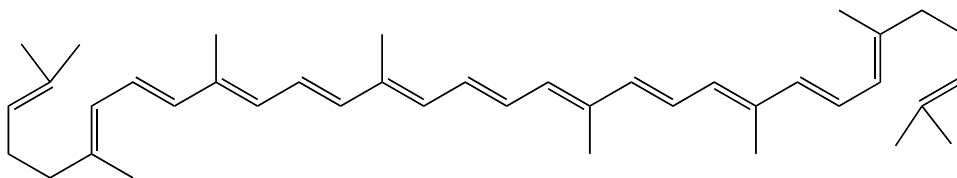
- VI. A patient suffering from renal failure (diabetes) is also experiencing osteomalacia. Suggest a possible reason for the complication. Would Vitamin D be a suitable treatment for osteomalacia here? Why or why not?

VII. Based on the following structures, suggest possible applications for the drugs.

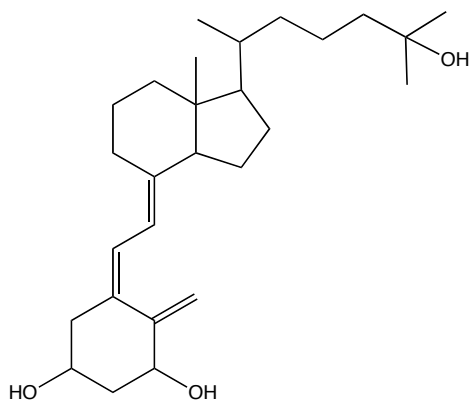
1.



2.



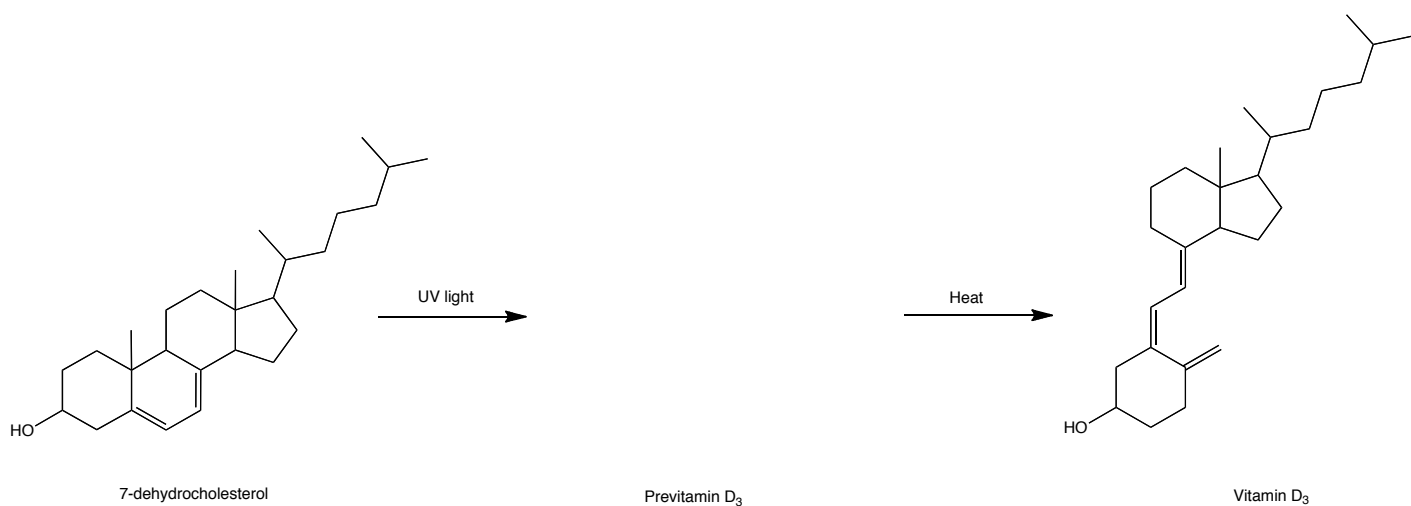
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VIII. What would be a major risk of giving a Vitamin K antagonist in high doses with an anticoagulant such as warfarin?

IX. Briefly describe the role of Vitamin D in the body.

X. Draw an arrow-pushing mechanism for the conversion of 7-dehydrocholesterol to Vitamin D₃, including the structure for Previtamin D₃.



WATER-SOLUBLE VITAMINS

XI. Match the vitamin or mineral with the corresponding recommended daily value amount and unit.

| | <u>Amount</u> | <u>Unit</u> |
|----------------------------|---------------|-------------|
| 1. Thiamin | a) 20 | x) mg |
| 2. Biotin | b) 0.3 | y) μ g |
| 3. Folacin | c) 10 | z) IU |
| 4. Vitamin B ₁₂ | d) 1.7 | |
| 5. Riboflavin | e) 0.4 | |
| 6. Niacin | f) 6.0 | |
| 7. Pantothenic Acid | g) 60 | |
| 8. Vitamin C | h) 1.5 | |
| 9. Vitamin B ₆ | i) 2.0 | |

XII. In many cases, water-soluble vitamins can be taken in high doses without side effects.

A. Explain why.

B. Give two examples where toxicity has been observed and list the symptoms of toxicity.

XIII. The following are signs of a vitamin deficiency. For each, list the most appropriate single deficient vitamin.

1. Increased plasma pyruvate -
2. Decreased erythrocyte glutathione reductase activity -
3. Increased plasma homocysteine -
4. Increased urinary xanthurenic acid -

XIV. For the following conditions:

- A. Name the vitamin that has been shown to be of some benefit.
- B. What enzyme/reaction is activated by high doses of the vitamin?

1. Homocystinuria -
2. Wernicke-Korsakoff syndrome -
3. Methylmalonic aciduria -

XV. Elevated homocysteine is a significant risk factor for coronary vascular disease. What 3 vitamins are involved in homocysteine metabolism (thereby decreasing levels)?

XVI. Which vitamins are associated with the following functions?

1. Decarboxylation
2. Transamination
3. Purine and pyrimidine synthesis
4. Electron transport
5. Niacin synthesis
6. Collagen synthesis

XVII. Provide a metabolic explanation for the following (a scheme may be necessary for a cogent answer, but structures are not).

A. Niacin may be deficient if B₆ intake is inadequate.

B. Homocysteine levels may be elevated if B₆ intake is inadequate.

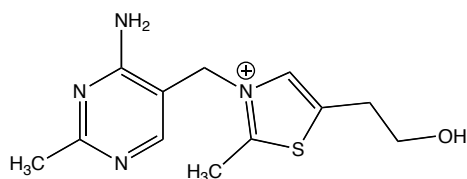
C. A folate deficiency is observed during a B₁₂ deficiency.

XVIII. Why is it important that a woman who is pregnant or planning on becoming pregnant should receive supplemental folate?

XIX. Folic acid requires a prescription for high doses, even though it is essentially non-toxic. Why?

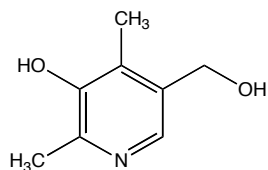
MEDCH 562P
Fall 2011
Problem Set #4

- XX.** The following are vitamin antagonists. For each:
1. Suggest the vitamin antagonized.
 2. Suggest one symptom that you might expect with chronic administration of the antagonist.



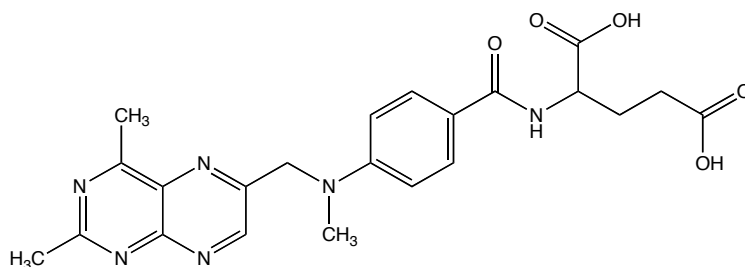
A. _____

B. _____



A. _____

B. _____



A. _____

B. _____