

Chapter 23 and 24
Selected answers to homework problems

23.16a – This pathway was not covered in class and you will not be held responsible for it.

23.30 – In glycogenolysis, the breakdown of glycogen produces glucose when it is needed. In glycogenesis, glycogen is synthesized from glucose when glucose is in excess.

23.52 – The exact reverse of an energetically favorable reaction must be energetically unfavorable. Since glycogenolysis is energetically favorable, its exact reverse must be energetically unfavorable. Thus, glycogenesis must occur by an alternate pathway that is energetically favorable.

24.15 – The triacylglycerol that has the highest melting point has the greatest percent of saturated fatty acids. Of the four fatty acids listed, palmitic acid and stearic acid are saturated, and oleic acid and linoleic acid are unsaturated. Thus, if you add the percentages in the table, you arrive at a new table.

<i>Triacylglycerol</i>	<i>% saturated fatty acids</i>	<i>% unsaturated fatty acids</i>
Triacylglycerol A	49.2	47.5
Triacylglycerol B	28.9	70.8
Triacylglycerol C	19.5	76.8

This table shows that triacylglycerol A has the highest melting point. Triacylglycerol B and C are probably liquids at room temperature because their fatty acid composition more closely resembles that of the oils in Table 24.2 than that of the animal fats.

24.16 – Three of the fatty acids in the table shown in the previous problem are C₁₈ fatty acids (stearic acid, oleic acid, linoleic acid). When the triacylglycerols are hydrogenated, the unsaturated fatty acids are converted to stearic acid. The composition of the triacylglycerols after hydrogenation can be found by adding the percentages of C₁₈ fatty acids.

<i>Triacylglycerol</i>	<i>% C₁₆ fatty acids</i>	<i>% C₁₈ unsaturated fatty acids</i>
Triacylglycerol A	21.4	75.3
Triacylglycerol B	12.2	87.5
Triacylglycerol C	11.2	85.1

After hydrogenation, triacylglycerol B would be composed of 12.2% palmitic acid and 87.5% stearic acid. The hydrogenation product of triacylglycerol B closely resembles the hydrogenation product of triacylglycerol C because they have similar percentages of C₁₆ fatty acids and C₁₈ fatty acids.

24;42 – Glycerophospholipids have an ionic part (the head) and a nonpolar part (the tail). The ionic head protrudes outward toward the aqueous environment of the cell or inward toward the cell contents, and the nonpolar tails cluster together to form the membrane. Triacylglycerols don't have an ionic head and thus can't function as membrane components.