1. What is meant by the term "Enrichment"? **Vitamin and mineral supplementation of flour and bread. According to standard**

2. What guidelines are set by F.D.A. on Enriched Bread & Rolls in the U.S.?
   A. **Iron-12.5mg/1lb Bread**
   B. **Riboflavin- 1.1mg/1lb Bread**
   C. **Niacin- 15.0mg/1lb Bread**
   D. **Thiamine-1.8mg/1lb Bread**
   E. **Folic Acid .43mg/1lb Bread**
   F. **Calcium-600mg/1lb Bread (optional)**

3. What is the name given to ingredients used to prevent product spoilage (mold and bacteria growth)? **Mold Inhibitors**

4. List as many mold inhibitors as possible that are used in bread.
   A. **Calcium Propionate**
   B. **Sodium Propionate**
   C. **Potassium Sorbate**
   D. **Sodium Diacetate**
   E. **Vinegar**
   F. **Raisin Juice concentrate**
   G. **Fermented Flour**
   H. **Fermented Whey**

5. What are enzymes? **Protein materials from living things which act as catalysts in changing the substrate**

6. List the three (3) most important enzymes used in bread and roll production.
   A. **Amylases**
   B. **Protease**
   C. **Lipoxygenase**

7. What is diastatic malt syrup? **An enzyme-active product containing 60% maltose sugar and 20% water. It is used for flavor, crust color, and dough handling**

8. What is non-diastatic malt syrup? **The same product described above is heat treated to denature(or deactivate) the enzymes.**

9. Why would non-diastatic malt syrup be used over diastatic malt syrup?
   **When the baker wishes to add maltose sugar without adding amylase enzymes.**
10. What is the function of amylase enzymes? **To break down starches into sugars (starch conversion)**

11. What is the difference between alpha and beta amylases? **Beta Amylases act on the ends of a starch chain forming maltose sugar. Alpha Amylases can break any 1-4 linkage on the starch molecule.**

12. The miller and sometimes the baker adds alpha amylase to the flour or dough for what purposes?
   A. Miller - **To meet bakers specification on enzyme activity**
   B. Baker – **To promote starch conversion to sugars for improved crust color, flavor, yeast activity, machinability, and shelf life.**

13. What advantage do fungal amylases have over cereal amylases as far as the baker is concerned? **They are denatured at lower oven temperatures. This reduces the chance of over malting.**

14. What is the main purpose for bacterial amylases in breads? **To help extend shelf life by improving softness of crumb.**

15. What do protease enzymes do in a dough? **They weaken the protein by cutting protein chains into smaller units.**

16. Give two reasons how the baker would use protease enzymes to his advantage.
   A. **Protease will improve pan flow**
   B. **Protease will reduce a wild break (make it smoother)**

17. Enzyme active soy flour contains what enzyme? **Lipoxygenase**

18. What would be the main purpose for using enzyme active soy flour in bread or roll products? **To whiten the crumb**

19. What is the maximum usage level permitted by F.D.A. in the U.S. of enzyme active soy flour in bread products? **0.5%**

20. What are the functions of soy flour in bread and roll products?
   A. **Improve nutrition**
   B. **Extend shelf life**
   C. **Improve toasting qualities**
   D. **Improve crust color**

21. Why is soy flour **high** heat treated before use in bread products? **To eliminate the trypsin factor (enzyme that aids in digestion of protein “enzyme blocker”) so protein can be used by the human body**
22. What are oxidizing agents? Chemical additives which create bonds between protein chains. The result is improved gas retention and dough strength.

23. What do oxidizing agents cause to happen in yeast leavened doughs? Improved volume and tighten grain in finished product.

24. What does "p.p.m." stand for? parts - per - million

25. List the oxidizing agents which are permissible in the U.S. by F.D.A., along with their maximum allowable usage level.

<table>
<thead>
<tr>
<th></th>
<th>ppm</th>
<th></th>
<th>ppm</th>
</tr>
</thead>
<tbody>
<tr>
<td>A. Potassium Bromate</td>
<td>75</td>
<td>E. Calcium Peroxide</td>
<td>75</td>
</tr>
<tr>
<td>B. Calcium Bromate</td>
<td>75</td>
<td>F. Azodicarbonamide</td>
<td>45</td>
</tr>
<tr>
<td>C. Potassium Iodate</td>
<td>75</td>
<td>G. Ascorbic Acid</td>
<td>No Limit</td>
</tr>
<tr>
<td>D. Calcium Iodate</td>
<td>75</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

26. Potassium Bromate & Calcium Bromate are considered late-acting oxidants. What two things trigger their reaction?

A. Higher Temperature  B. Lower pH

27. What is another name for ascorbic acid? Vitamin C

28. Does ascorbic acid still remain in the baked product after baking? No it is destroyed in the oven

29. In the U.S., oxidation if added by the baker, is usually in the form of tablets (so many p.p.m./tablet per 100 lbs. of flour). What is the calculation for determining the desired number of tabs for a dough if the desired p.p.m. is known? \( \text{ppm desired} \times \text{cwt. flour} = \text{tablets} \)

\[ \text{ppm per tablet} \]

30. How does Calcium Peroxide differ from other oxidizing agents? It acts as a dough dryer so the dough is not too sticky for make up

31. What happens to breads when excess Potassium Bromate is used?

A. Proofer = slower expansion of dough

B. Oven = excess oven kick

32. What are reducing agents? Chemical additives which break bonds between protein chains. The result is reduced mixing time.

33. How do reducing agents work in a dough? They break disulfide bonds between proteins.
34. Why would a baker use reducing agents? To reduce mix times, To soften strong flours, To improve machinability

35. List the reducing agents which are available to the baker:

A. L-Cysteine  
B. Sorbic Acid  
C. Sodium Bisulfite  
D. Fumaric Acid  
E. Ascorbic Acid

36. When is ascorbic acid not a reducing agent? When oxygen is present

37. Sulfite compounds create certain characteristics in the dough different from other reducing agents. What is this difference? Very good sheeting capability. The dough is less likely to tear.

38. List two problems which sulfite usage causes.

A. It destroys thiamin
B. Asthmatics may be sensitive and have side effects.

39. What is a dough strengthener? An emulsifier which bonds with protein to improve gas retention and volume.

40. How do dough strengtheners work? They bond with protein

41. What is a crumb softener? An emulsifier which bonds with starches to slow down crumb firming (extends shelf life)

42. How do crumb softeners work? They bond with starches.

43. List some common dough strengtheners and crumb softeners.

A. SSL  
B. CSL  
C. Ethoxylated Monoglyceride  
D. Sucrose Esters  
D. Polysorbate 60  
E. Succinylated Monoglyceride  
F. Datem  
G. Mono and Diglycerides

44. Which is the most common crumb softener? Mono and Diglycerides

45. Knowing the % of alpha-mono fraction is important for what reason? Alpha mono is the active ingredient that provides crumb softness

46. Define the term "Dough Conditioner". Any additive which has an improving effect on a dough or finished product.