Why Seafood Spoils

Spoilage begins as soon as seafood species die. Their normal defense mechanisms stop working and a series of changes begin that cause spoilage. These changes are caused by bacteria, enzymes and chemical action.

Spoilage By Bacteria

Bacteria are the most important cause of seafood spoilage. Millions of bacteria are present in the surface slime, on the gills, and in the gut of living seafood species. When seafood species die, bacteria, or the enzymes they produce, invade the flesh through the gills, along blood vessels, and directly through the skin and belly cavity lining. In the flesh, bacteria grow and multiply, producing compounds which are responsible for "fishy" odors and flavors, and discolorations associated with stale seafood. If food poisoning bacteria are present, they can multiply and cause illness when the seafood is eaten.

Spoilage By Enzymes

Many different enzymes are present in living seafood species. They help build tissue, contract and relax muscles, and digest food. When seafood species die, enzymes continue to work and start to digest or breakdown the flesh. This causes the flesh to soften and lowers the quality. Enzymes also produce more food for bacteria to feed on, increasing the rate of spoilage.

Spoilage By Chemical Action

Oxygen in the air can attack unsaturated oils in seafood causing rancidity, off-odors and off- flavors. This is especially important in fatty fish such as salmon and mackerel.

Slowing Seafood Spoilage

All of the changes that cause seafood spoilage are affected by temperature. High tempera tures speed spoilage and low temperatures slow spoilage. For many seafood species, increasing the temperature from 32F to 40F doubles the rate of spoilage and cuts the shelf life in half.

Sanitation is also important. Contamination of seafood by bacteria from dirty ice, containers and surfaces can increase the number of bacteria on seafood and speed spoilage. Contamination with food poisoning bacteria can cause illness when the seafood is eaten. Keeping seafood handling and storage equipment clean reduces bacterial contamination and slows spoilage.

Shelf Life

The approximate shelf life for fresh fish fillets is:

Holding Temperature (°F)	High Quality Shelf Life	Edible Shell Life
90	14 hours	1 day
60	1½ days	2½ days
42	3 days	6 days
32	8 days	14 days

30	10 days	17 days
29	12 days	20 days

Effect of Temperature on Shelf Life

	Holding Temperature (°F)											
	29	30	32	34	36	38	40	45	50	55	60	65
Time at Holding Temperature	Equivalent Age of Product in Days at 32°F											
2 hours	0.1	0.1	0.1	0.1	0.1	0.1	0.2	0.2	0.3	0.4	0.5	0.7
4 hours	0.1	0.1	0.2	0.2	0.2	0.3	0.3	0.5	0.7	0.9	1.1	1.3
6 hours	0.2	0.2	0.3	0.3	0.4	0.4	0.5	0.7	1.0	1.3	1.6	2.0
12 hours	0.3	0.4	0.5	0.6	0.7	0.9	1.0	1.5	2.0	2.6	3.3	4.0
18 hours	0.5	0.6	0.8	0.9	1.1	1.3	1.6	2.2	3.0	3.9	4.9	6.0
1 day	0.7	0.8	1.0	1.2	1.5	1.8	2.1	3.0	4.0	5.2	6.5	8.0
2 days	1.4	1.6	2.0	2.5	3.0	3.6	4.2	5.9				
3 days	2.1	2.4	3.0	3.7	4.5	5.3	6.3					
4 days	2.8	3.2	4.0	4.9	7.1	8.4						
5 days	3.5	4.0	5.0	6.2								
6 days	4.1	4.7	6.0									
7 days	4.8	5.5	7.0									
8 days	5.5	6.3	8.0									
9 days	6.2	7.1										
10 days	6.9	7.9										
11 days	7.6											
12 days	8.3											

Example			
	Actual Elapsed Time	**Temp.**	**Equivalent Age at 32°F**
Fish Caught	2 hours	60°F	0.5 days
Storage on vessel	3 days	34°F	3.7 days
Processing	12 hours	45°F	1.5 days
Distribution	12 hours	36°F	0.7 days
Retail case	1 day	38°F	1.8 days
TOTAL	**5.1 days**		**8.2 days**
Remaining high quality shelf life at		32°F	5 hours
Remaining edible shelf life at		32°F	5.8 days
		40°F	2.7 days

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