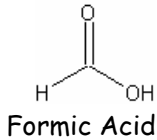


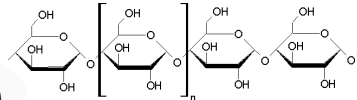
What Do These Things Have to Do with a **Challenging Career?**



Phytosterols



Osama bin Laden



Gum arabic

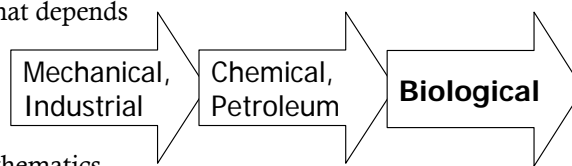
ETHANOL



(answers below)

They're all biobased products, which need expertise in Food and Bioprocess Engineering.

Why should you care? In the future, our world will be relying upon biobased products because they offer many benefits over conventional products. Over time, our society has developed technology that depends upon mechanical, chemical and eventually biological systems. This will require engineers that can understand principles of biology, biochemistry, physics, mathematics and engineering. Products will range from starch, to polylactic acid, to corn fiber, to motor fuels. Progressive industries have already recognized this and help put together a document envisioning a biobased industry (3).



What's Food and Bioprocess Engineering (FBE)? It's the application of engineering principles to biological materials to make useful products. FBE is a specialization within the Agricultural Engineering major, an ABET accredited degree awarded by the College of Engineering. A food and bioprocess engineer can refine biological materials into biochemicals which are made into useful consumer products. Food and bioprocess engineers are also involved with heat, mass and momentum transfer to design and analyze processing systems.

Some companies already developing biobased products:

| | | |
|-------------|-------------|----------|
| Cargill | Syngenta | Genencor |
| Novozymes | BASF | ADM |
| Rohm & Haas | Tate & Lyle | Dow |

Fire ants make formic acid. U of I researchers are developing fuel cells that use formic acid (1). Someday, it may be feasible to make formic acid by fermenting biological

materials. *Lactococcus lactis* bacteria are used to produce formic acid from simple sugars, such as glucose from corn (2). Getting it to work will be a challenge for FBEs. **Starch** is a polymer of glucose. You could be wearing, drinking, burning or eating starch products on a daily basis. It's a common starting point for bioprocesses that make building block chemicals. **Ethanol** is blended with gasoline, reducing our dependence on petroleum. An FBE will understand the biological material and bioprocessing used to make ethanol. By 2008, we'll be making about 6.5 billion gallons per year at over 120 plants. But, for every ton of ethanol produced, we make another ton of distillers dried grains with solubles which is low valued and a big challenge for bioprocessing design (4). **Phytosterols** have been shown to reduce cholesterol. These compounds naturally occur in the corn kernel's outer coating. Using processes developed jointly by USDA and U of I researchers, these components can be recovered during ethanol production. **Gum arabic** is used to enhance texture of products such as salad dressings, marshmallows and ice cream. Corn fiber gum has been shown to be a superior replacement for gum arabic. The US State Department has stated that while **Osama bin Laden** had considerable holdings in Sudanese gum arabic production, he divested from these when he was expelled from Sudan in 1996.

Like **Lego bricks**, there are 12 building block chemicals needed for high valued products, including:

- ✓ Aspartic acid
- ✓ Glucaric acid
- ✓ Glycerol
- ✓ Sorbitol

References and Reading for Your Future:

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