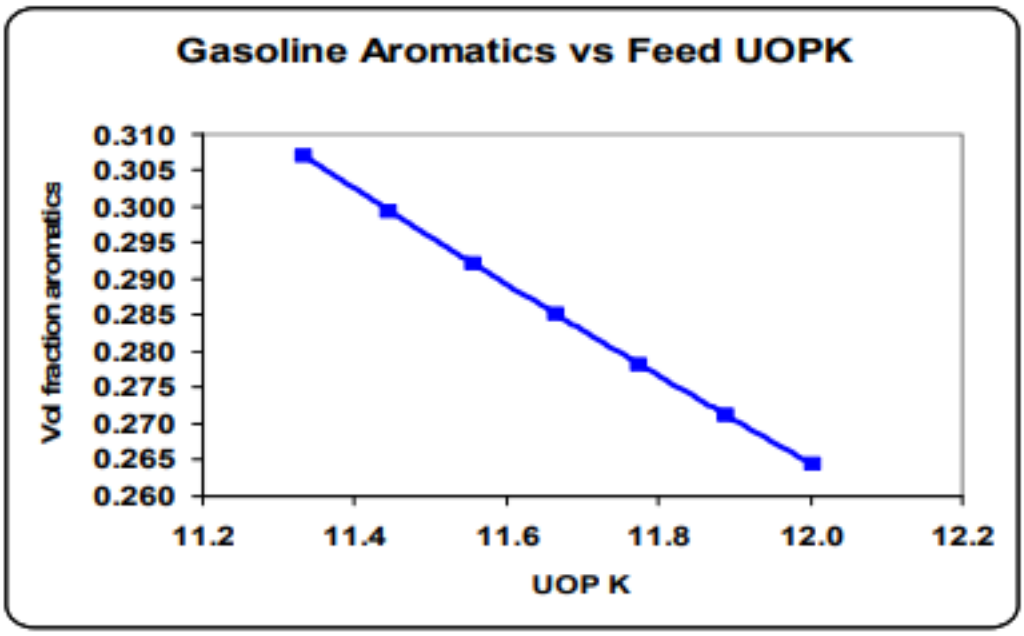
Question 15: What variables influence gasoline aromatics? In particular, please address feed properties, catalyst, and FCC operating conditions.

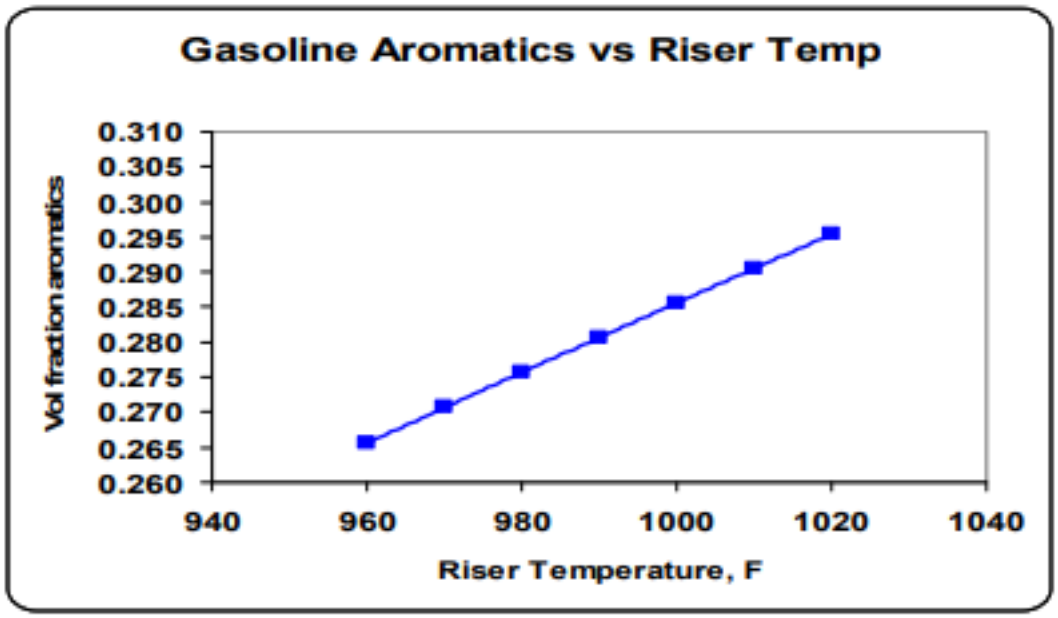
HEATER (BASF Catalysts)

Feed properties play an important role, namely the amount of one- and two-ring aromatics in the feed. Single-ring aromatics pretty much go straight to gasoline. Many single-ring aromatics in gasoline, however, are formed via reactions; either via cyclization or the cracking of partially saturated multi-ring compounds.

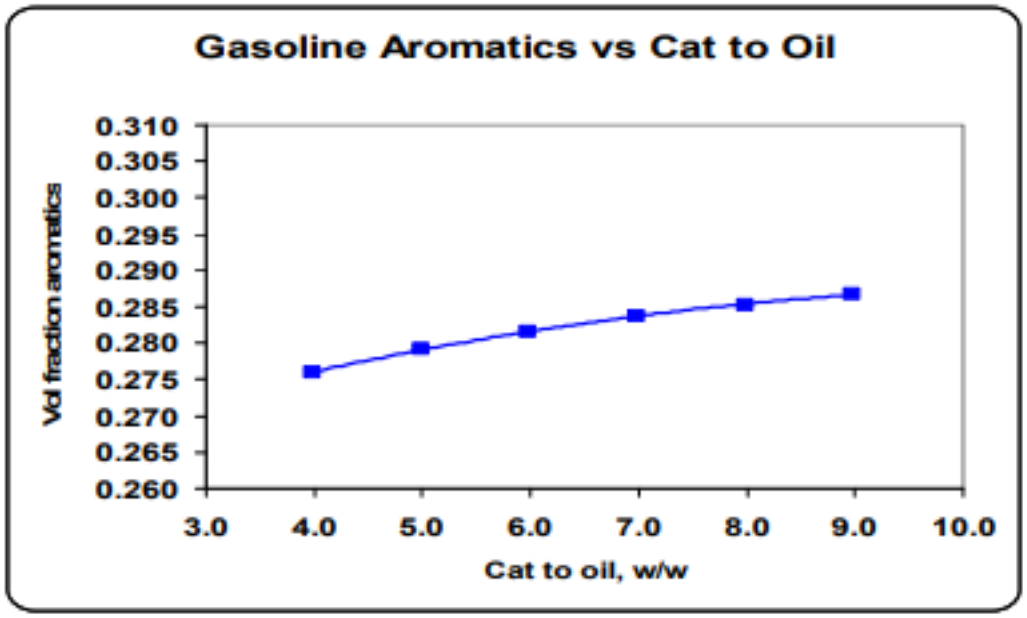
The graphs show where I have plotted gasoline aromatics versus several parameters using data, once again, from our model. The first one shows you that as you go to more paraffinic feeds, you are going to make less aromatics in the gasoline. It is a fairly sharp slope on that.



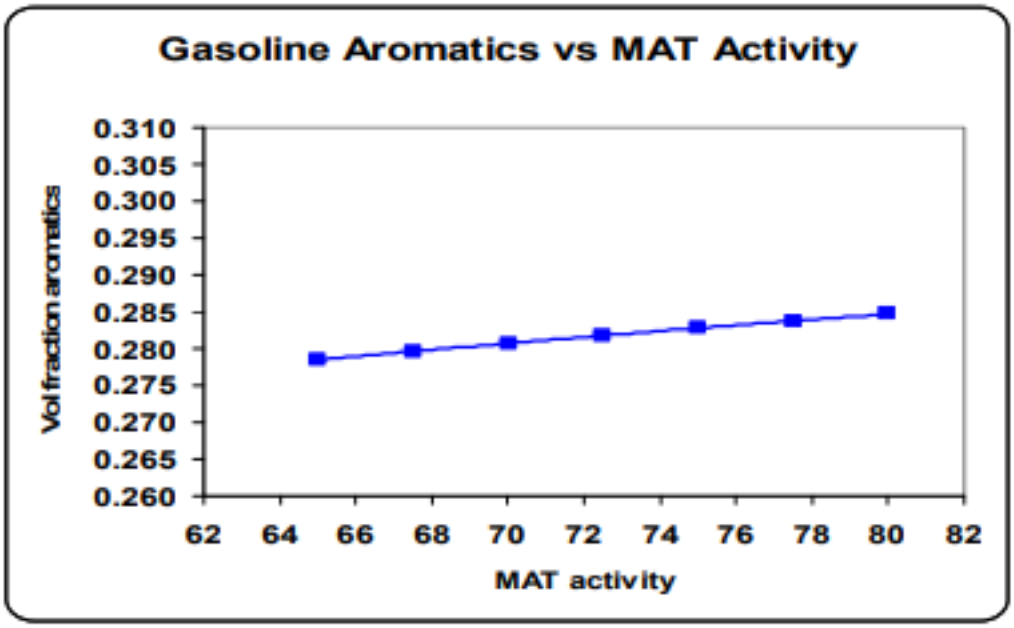
In the case of gasoline aromatics verses riser temperature, as you raise riser temperature, you tend to increase the gasoline in the aromatics. Once again, there is a fairly steep slope to the curve.



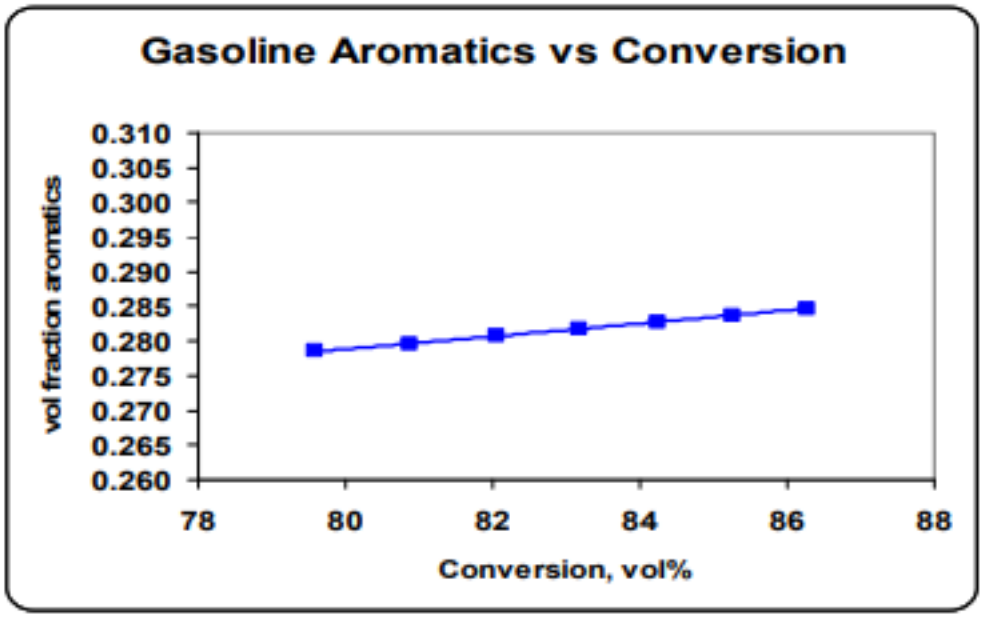
On the Gasoline Aromatics versus Cat to Oil graph, you can see that increasing cat to oil increases gasoline aromatics, but the slope is fairly flat. There is not a gigantic correlation there.



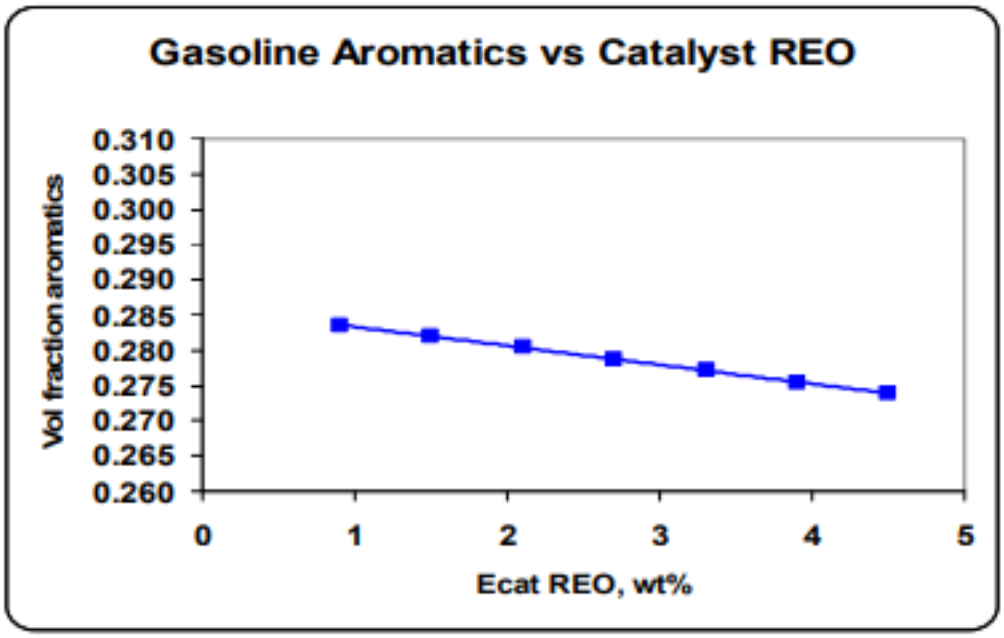
There is a slight increase in gasoline aromatics with catalyst activity, but it is also a fairly flat slope.



This graph shows, again, a fairly flat slope. When you compare that with the Aromatics versus Riser Temperature graph, you can see that there is a much sharper slope. This one is flatter because of better selectivity and more hydrogen transfer. When it is done thermally, the paraffins, olefins, and naphthenes can overcrack to LPG, which tends to concentrate the aromatics in the gasoline.



This slide shows that as you increase rare earth, you increase hydrogen transfer and you tend to decrease the aromatics. I get asked this question fairly often, but there is not a great deal that can be done, catalytically, to influence the aromatics in the gasoline.



THOMPSON (Chevron)

I agree with the comments that have been made so far. Basically, the feed properties are a big contributor to whether you make aromatic products or not. As far as the hydrogen transfer, ZSM-5, for example, or catalyst properties of ZSM-5 tend to increase the aromatics by a concentration effect. Finally, as far as operating condition, increased riser temperature definitely increases aromatics by dealkylation and cracking paraffins.

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