



**ENERGY HARVESTING SYSTEMS**  
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Energy Independence, LLC

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April 22, 2008

Email from Margaret Sheppard

From: Sheppard.Margaret@epamail.epa.gov  
Sent: Tuesday, September 04, 2007 10:25 AM  
To: Sam E. Johnston II  
Cc: Belefski.Mary@epamail.epa.gov  
Subject: RE: R410A/R421/422

*FROM JOHNSTON  
SAM JOHNSTON  
104 POOLE RD  
SUFFIELD CT 06078*



Sam,

Bioconcentration factors are low for all components of R-410A, R-421, and R-422--anything above 1000 is considered too high:

HFC-32 (in R-410A): BCF = 3.2

HFC-125(in R-410A): BCF = 3.1

HFC-134a: BCF = 3.9

Isobutane (in R-422): BCF = 27

Aquatic toxicity values-- according to the PBT profiler, isobutane is more toxic than the other components,

and is the only one of potential concern. It also is a small constituent of the blends, so impact would

be lessened. LC50= concentration at which 50% of fish die in

test--higher numbers are less toxic. LC50 > 10 mg/l are not of significant concern.

HFC-32 (in R-410A): LC50 = 66 mg/l

HFC-125 (in R-410A): LC50 = 28 mg/l

HFC-134a: LC50 = 18 mg/l

Isobutane (in R-422): LC50 = 3.5 mg/l

R-22 falls in a similar range with the HFCs.

Good luck--thanks for trying to identify refrigerants that are likely to minimize environmental impacts.

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