Chem. 540
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Math Problem 7

Evaluate the integrals

(a) $\int_0^\infty e^{-ax} dx$

(b) $\int_0^\infty xe^{-ax} dx$

(c) $\int_{-\infty}^\infty xe^{-ax^2} dx$

(d) $\int_0^\infty xe^{-ax^2} dx$

(e) $\int_{-\infty}^\infty e^{-ax^2+bx} dx$

where a is a positive parameter.

For some of these you may use the very useful result $\int_{-\infty}^\infty e^{-ax^2} dx = \sqrt{\dfrac{\pi}{a}}$.

You will save some work if you use clever tricks such as integrating by parts, differentiating under the integral sign or completing the square.