Partition coefficients of some acetate esters and alcohols in water, blood, olive oil, and rat tissues

T Kaneko, P-Y Wang, A Sato

Abstract
Partition coefficients of hydrophilic organic solvents (C6-C10 acetate esters and alcohols) in distilled water, olive oil, human blood, and various rat tissues (blood, liver, kidney, brain, muscle, and fat) were determined. Water/air partition coefficients were measured by a new vial equilibration technique, which needs no direct measurement of the concentration in either the liquid phase or the gas phase, but only the gas chromatographic peak areas from both phases. Once the water/air partition coefficients had been measured, the blood/air, oil/air, and tissue/air partition coefficients could be measured by the previously developed vial equilibration method, which uses gas chromatographic peak areas from the gas phases in the sample (which contains test material) and the reference (which contains no test material) vessels. The alcohols tested were 32 (methanol) to 128 (1-pentanol) times more hydrophilic than the corresponding esters compared with oil/water partition coefficients. In general, water/air partition coefficients decreased and oil/air partition coefficients increased in proportion to the number of carbon atoms. Blood/air coefficients of alcohols were almost parallel to water/air partition coefficients, whereas no such relation was found with acetate esters. n-Isomers of both acetate esters and alcohols found to be more soluble in water, blood, oil, and tissues than the corresponding iso-isomers.

Physiologically based pharmacokinetic (PB-PK) modelling provides us with a useful tool for insight into the pharmacokinetic profiles of organic solvents. Many reports have described PB-PK models for lipophilic solvents, whereas few discuss such models for hydrophilic compounds. Partition coefficients between blood and air and between tissue and blood are the prerequisite values for developing a PB-PK model. Lack of partition data may be one reason why a model of this kind has not been established for hydrophilic solvents. We reported a simple vial equilibration method to determine partition coefficients between liquid (including tissue homogenates) and air. Partition coefficients of many volatile compounds in various fluids and tissues have been measured successfully with this technique, which needs no direct measurement of the concentration either in the liquid or in the air phase. It needs only the gas chromatographic peak heights or peak areas of the air in the sample (which contains test material) and reference (which contains no test material) vessels. The partition coefficients of lipophilic compounds were measured easily by this method, but applying it to hydrophilic compounds was difficult because of their high water solubility.

Fiserova-Bergerova and Diaz reported blood/air and tissue/air partition coefficients of several hydrophilic compounds (alcohols and ketones) that were determined by a method essentially the same as the one we reported previously except that their method uses a gas standard in place of an aqueous standard. Blood/air partition coefficients of some hydrophilic solvents were also measured by other investigators by methods based on the same principle as that used in our previous study. The values reported by Fiserova-Bergerova and Diaz were lower than the ones reported by the other investigators. Fiserova-Bergerova and Diaz stated that the use of aqueous standard instead of gas standard may be one of the possible explanations for this discrepancy.

Tissue homogenates in water are generally used to measure tissue/air partition coefficients. Aqueous standard is more natural than gas standard when tissue homogenates are used. In such a measurement, however, an accurate water/air partition coefficient is needed to make the adjustment for solubility in added water.

We report a new head space technique to determine the water/air partition coefficients for hydrophilic volatile compounds. This method again needs no direct measurement of the concentration in either the liquid phase or the gas phase; only the gas chromatographic peak areas from both phases. Once the water/air partition coefficient has been determined, the vial equilibration method can be used to measure the partition coefficients between blood and air, oil and air, and tissue and air. By means of these techniques, we determined partition coefficients of eight acetate esters and eight alcohols in distilled water, olive oil, human blood, and various rat tissues.
Materials and methods

CHEMICALS AND TEST MATERIALS

Acetate esters (methyl, ethyl, n-propyl, iso-propyl, n-butyl, iso-butyl, n-pentyl, and iso-pentyl acetates) and alcohols (methyl, ethyl, n-propyl, iso-propyl, n-butyl, iso-butyl, n-pentyl, and iso-pentyl alcohols) were purchased from Wako Pure Chemicals (Tokyo) and were of high analytical purity (>99%). The water used had been distilled, and the olive oil was a reagent grade purchased from Tokyo Kasei Co (Tokyo). The human blood was collected from five healthy men (average age 30, mean packed cell volume 51.8%) after obtaining informed consent from each volunteer.

Rats were anaesthetised with a sodium pentobarbitone solution. Blood was collected from the abdominal aorta with a heparinised syringe. The liver, kidneys, muscles, brain, and fat were excised and weighed. The tissues, except fat, were homogenised with a known volume of distilled water and an aliquot of the homogenate was used as test material. The net volume of each tissue was calculated assuming that the specific gravity of tissue is unity. The fat tissue was homogenised without adding water, and a portion (approximately 0.5g) was used for partition measurement. The volume of the fat sample was calculated from its average specific gravity of 0.908.

MEASUREMENTS

Principle of water/air partition measurement

An aliquot of aqueous solution of each compound is put in an air tight vessel that is kept in a thermostatically regulated water bath (37°C) to establish equilibrium between the gas and liquid phases. The concentrations in the liquid and gas phases at equilibrium are designated for convenience as \( X_L \) and \( X_G \) moles/ml, respectively. A volume of liquid \( V_{\mu l} \) of the liquid phase is injected into a gas chromatograph. Gas chromatographic response (peak area) is proportional to the quantity \( X_L V_{\mu l} \times 10^{-3} \) mol introduced into the chromatograph. If the resultant peak area is \( A_L \), then

\[
A_L = kX_L V_{\mu l} \times 10^{-3}
\]  
(1)

where \( k \) is a constant depending on each compound. Equation 1 can be rewritten as:

\[
X_L = \frac{A_L}{k V_{\mu l}} \times 10^3
\]  
(2)

If \( V_\alpha \) ml of the gas phase, which contains \( X_\alpha V_\alpha \) mol of the compound, gives \( A_\alpha \) cm\(^2\) peak area; then the following equation holds:

\[
A_\alpha = kX_\alpha V_\alpha
\]  
(3)

Hence,

\[
X_\alpha = \frac{A_\alpha}{k V_\alpha}
\]  
(4)

By definition, \( \lambda \) (water/air partition coefficient) = \( X_L/X_\alpha \). From (2) and (4),

\[
\lambda = \frac{A_L V_\alpha}{A_\alpha V_{\mu l}} \times 10^3
\]  
(5)

Thus we can measure the water/air partition coefficient of a hydrophilic volatile compound from only the gas chromatographic peak area ratio between the liquid and gas phases. The advantage of this technique is that the measurement can be made without knowing the exact volume of the equilibration vessel, liquid phase, or gas phase. Also, the partition value is independent of the water concentration of a test compound.

Measurement procedures

An aqueous solution (4 ml) of each compound (50 \( \mu l/100 \) ml) was placed in a head space vial (Perkin-Elmer; 22 ml in volume). This was immediately capped with a Teflon lined stopper. The vial was kept at 37°C in a water bath with a shaker. After 10 minutes of temperature equilibration, the air pressure in the vessel was made equal to the atmospheric pressure by briefly inserting an air pipe (hypodermic needle) through the stopper. The needle was then removed, and the vessel was kept at 37°C for not less than a further 30 minutes to establish the equilibration of the compound between the liquid phase and the overlying air. One millilitre \( (V_\alpha = 1 \) in equation 5) of the gas phase was withdrawn in a gas tight Hamilton syringe (1002–01) and injected into a gas chromatograph with a hydrogen flame ionisation detector (Hitachi 263). After the peak appeared, 5 \( \mu l \) \( (V_\alpha = 5 \) in equation 5) of the liquid phase were injected into the gas chromatograph rapidly with a Hamilton microsyringe (701–02). The peak areas from the gas and liquid phases obtained with an integrator (Hitachi D-2500) were used to calculate the water/air partition coefficient according to equation 5. The measurement was performed in quintuplicate for each compound.

The operating conditions of the gas chromatograph were: 2 m \( \times \) 3 mm glass column packed with PEG-400 on Unisport B (Gasukuro Kogyo, Tokyo) at 80°C; injection port temperature, 100°C; carrier gas, \( N_2 \) at 70 ml/min; \( H_2 \) at 20 ml/min. As a preliminary trial to examine the usefulness of this technique, the partition coefficient of methyl alcohol, a prototype compound, was measured with three concentrations of water solution (25, 50, and 100 \( \mu l/100 \) ml) and three volumes of liquid phase (2, 4, and 8 ml). As no significant differences were found among the partition coefficients thus obtained (data not shown), 4 ml of aqueous solution at a concentration of 50 \( \mu l/100 \) ml was used as the liquid phase of each compound in the regular measurement. Gas chromatographic responses (peak areas) from both the gas and liquid phases were linearly related to the concentration of water solution at every volume of the liquid phase used (data not shown).

Blood/air, oil/air, and tissue/air partition coefficients

Blood/air, oil/air, and tissue/air partition coefficients were determined by a previously reported vial equilibration method. Briefly,
a 0.1 ml aliquot of an aqueous solution of each compound (50 μl/100 ml) was put in a sample (containing test material) and a reference vessel (containing no test material). The vessels (Perkin-Elmer, 22 ml head space vials) were then allowed to stand in a thermoregulated water bath with a shaker at 37°C for not less than 30 minutes. After the equilibrium was reached, 1 ml of the air in each vessel was injected into a gas chromatograph equipped with a hydrogen flame ionisation detector (Hitachi 263). The operating conditions of this were the same as already described. The peak areas found from the sample and reference vessels were used to calculate the material/air partition coefficients according to the equation reported elsewhere.11

The oil/water partition coefficient was calculated as the ratio between oil/air and water/air, and the tissue/blood as the ratio between tissue/air and blood/air.

Results and discussion

PARTITION COEFFICIENTS OF ACETATE ESTERS

Acetate esters could be ranked by their water/air partition coefficients as follows (table 1): methyl > ethyl > n-propyl > iso-propyl > n-butyl > iso-butyl > n-pentyl > iso-pentyl. Thus the water/air partition coefficients decreased as the number of aliphatic carbon atoms increased. The values for n-isomers were higher than values for the corresponding iso-isomers.

By contrast with water/air partition coefficients, the oil/air partition coefficients increased with the number of aliphatic carbon atoms (table 1). When the oil/air partition coefficients were used to rank the eight acetate esters, the results were: n-pentyl > iso-pentyl > n-butyl > iso-butyl > n-propyl > iso-propyl > ethyl > methyl. n-Isomers were more soluble in oil than the corresponding iso-isomers. Comparing oil/water partition coefficients among eight acetate esters, methyl acetate (oil/water < 1) could be categorized as hydrophilic; n-pentyl and iso-pentyl acetates (oil/water > 100) as lipophilic; and ethyl, n-propyl, iso-propyl, n-butyl and iso-butyl acetates (1 < oil/water < 100) as intermediate compounds.

Body tissues, including blood, contain several esterases, such as carboxylesterases, which may hydrolyse acetate esters and thereby affect the measurement of their tissue/water partition coefficients. We found that when ethyl acetate was incubated with intact tissue homogenates, the gas chromatographic peak area from the air in the incubation vessel decreased during the incubation period (fig 1). We therefore concluded that inactivation of esterases was needed to measure tissue/air partition coefficients of acetate esters.

To inhibit the hydrolytic reaction, phenylmethylsulphonyl fluoride (PMSF, from Wako Pure Chemicals, Tokyo), an inhibitor of serine protease, was used. In pilot studies, PMSF (20 mg/g tissue) was found to block the hydrolysis completely (fig 1). The mean (SD) esterase activities for ethyl acetate were in the liver 18:1 (1:4), kidney 17:9 (1:2) and blood 2:11 (0:21) μmol/min of rats as determined from the rate of disappearance of substrate measured in quintuplicate by the method described by Sato and Nakajima.21 The activities in the liver and kidney were eight to nine times higher than activity in the blood. Esterase activity was found in every tissue tested, with the lowest activity in the brain. The activity in fresh human blood (2:17 (0:23) μmol/ml/min, n = 5) was almost the same as that in rat blood.

Partition coefficients in tissues were measured after 30 minutes preincubation of tissue samples with PMSF at 37°C. Human blood/air partition coefficients remained in a narrow range from 33:1 (iso-propyl acetate) to 92:4 (n-pentyl acetate), a 2-8 fold difference (table 1). The solubility in rat blood was

Table 1  Partition coefficients of C₅-C₇ acetate esters in water, olive oil, human blood, and rat blood

<table>
<thead>
<tr>
<th>Acetate</th>
<th>Water/air</th>
<th>Olive oil/air</th>
<th>Oil/water</th>
<th>Human blood/air</th>
<th>Rat blood/air</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl</td>
<td>108 (5)</td>
<td>85.7 (11:2)</td>
<td>0.79</td>
<td>90±1 (3:7)</td>
<td>100 (4)</td>
</tr>
<tr>
<td>Ethyl</td>
<td>71.5 (2:1)</td>
<td>176 (15)</td>
<td>2.46</td>
<td>76±8 (3:4)</td>
<td>81±7 (4:8)</td>
</tr>
<tr>
<td>n-Propyl</td>
<td>53.0 (3:0)</td>
<td>503 (37)</td>
<td>9.44</td>
<td>75±5 (1:7)</td>
<td>76±2 (4:6)</td>
</tr>
<tr>
<td>Iso-Propyl</td>
<td>34.1 (2:5)</td>
<td>301 (30)</td>
<td>8.83</td>
<td>33±1 (1:8)</td>
<td>35±1 (3:0)</td>
</tr>
<tr>
<td>n-Butyl</td>
<td>32.7 (2:7)</td>
<td>1620 (90)</td>
<td>40.5</td>
<td>83±4 (2:9)</td>
<td>89±4 (5:5)</td>
</tr>
<tr>
<td>Iso-Butyl</td>
<td>25.9 (2:1)</td>
<td>1280 (87)</td>
<td>40.4</td>
<td>45±2 (2:5)</td>
<td>52±0 (4:6)</td>
</tr>
<tr>
<td>n-Pentyl</td>
<td>24.0 (1:8)</td>
<td>3940 (480)</td>
<td>164</td>
<td>92±4 (9:4)</td>
<td>96±7 (8:1)</td>
</tr>
<tr>
<td>Iso-Pentyl</td>
<td>22.6 (1:8)</td>
<td>2950 (280)</td>
<td>131</td>
<td>59±1 (3:0)</td>
<td>64±7 (4:4)</td>
</tr>
</tbody>
</table>

*Values are means (SD) of five measurements.
†Calculated as (oil/air)/(water/air).

Figure 1  Hydrolysis of ethyl acetate in human blood and rat liver. Peak areas from the air in the incubation vessels where no esterase inhibitor (PMSF) was included were plotted against incubation period. The peak areas from the air in the vessels containing PMSF were counted at 100%.
Partition coefficients of some acetate esters and alcohols in water, blood, olive oil, and rat tissues

Slightly higher than in human blood, ranging from 35.1 (iso-propyl acetate) to 100 (methyl acetate), a 2.8 fold difference. For human blood, partition coefficients of acetate esters were in the order: n-pentyl > methyl > n-butyl > ethyl > n-propyl > iso-pentyl > iso-butyl > iso-propyl. There was no simple relation between the coefficient value and the structure of acetate esters. It is of special interest, however, that n-alkyl esters (methyl, ethyl, n-propyl, n-butyl, and n-pentyl acetates) were more soluble in blood than any of the iso-alkyl esters (iso-propyl, iso-butyl, and iso-pentyl acetates).

For every tissue tested, the tissue/air partition coefficient increased as the number of aliphatic carbon atoms increased (table 2). The eight acetate esters could be ranked by tissue/air partition coefficients as follows: n-pentyl > iso-pentyl > n-butyl > iso-butyl > n-propyl > iso-propyl > ethyl > methyl. n-Isomers had higher coefficients than the corresponding iso-isomers. For muscle, brain, kidney, and liver, the differences between the highest (n-pentyl acetate) and lowest (methyl acetate) partition coefficients were within a narrow range from 3.4 fold (brain) to 4.9 fold (liver), whereas the difference for fat tissue was 38 fold.

Table 2 Partition coefficients of C_5-C_10 acetate esters in rat tissues

<table>
<thead>
<tr>
<th>Acetate</th>
<th>Muscle/air*</th>
<th>Brain/air*</th>
<th>Kidney/air*</th>
<th>Liver/air*</th>
<th>Fat/air*</th>
<th>Muscle/</th>
<th>Blood</th>
<th>Brain</th>
<th>Kidney</th>
<th>Liver</th>
<th>Fat/ blood*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl</td>
<td>65.1 (14.2)</td>
<td>70.1 (6.7)</td>
<td>82.6 (6.2)</td>
<td>89.0 (9.8)</td>
<td>99.0 (7.3)</td>
<td>0.65</td>
<td>0.70</td>
<td>0.83</td>
<td>0.89</td>
<td>0.99</td>
<td></td>
</tr>
<tr>
<td>Ethyl</td>
<td>69.9 (9.4)</td>
<td>80.0 (8.4)</td>
<td>87.6 (12.1)</td>
<td>107 (17)</td>
<td>153 (8)</td>
<td>0.86</td>
<td>0.98</td>
<td>1.07</td>
<td>1.31</td>
<td>1.87</td>
<td></td>
</tr>
<tr>
<td>n-Propyl</td>
<td>84.7 (9.7)</td>
<td>99.9 (16.6)</td>
<td>197 (22)</td>
<td>230 (22)</td>
<td>514 (30)</td>
<td>1.11</td>
<td>1.31</td>
<td>2.59</td>
<td>3.02</td>
<td>4.75</td>
<td></td>
</tr>
<tr>
<td>iso-Propyl</td>
<td>70.9 (9.4)</td>
<td>88.9 (12.4)</td>
<td>142 (16)</td>
<td>148 (8)</td>
<td>303 (27)</td>
<td>2.02</td>
<td>2.55</td>
<td>4.05</td>
<td>4.22</td>
<td>6.63</td>
<td></td>
</tr>
<tr>
<td>n-Butyl</td>
<td>157 (15)</td>
<td>165 (21)</td>
<td>243 (26)</td>
<td>281 (19)</td>
<td>1520 (59)</td>
<td>1.76</td>
<td>1.85</td>
<td>2.72</td>
<td>3.14</td>
<td>17.0</td>
<td></td>
</tr>
<tr>
<td>iso-Butyl</td>
<td>110 (9)</td>
<td>138 (10)</td>
<td>212 (22)</td>
<td>263 (25)</td>
<td>1110 (78)</td>
<td>2.12</td>
<td>2.65</td>
<td>4.08</td>
<td>5.06</td>
<td>21.3</td>
<td></td>
</tr>
<tr>
<td>n-Pentyl</td>
<td>230 (31)</td>
<td>240 (12)</td>
<td>324 (30)</td>
<td>435 (16)</td>
<td>3730 (130)</td>
<td>2.38</td>
<td>2.48</td>
<td>3.35</td>
<td>4.50</td>
<td>38.6</td>
<td></td>
</tr>
<tr>
<td>iso-Pentyl</td>
<td>209 (17)</td>
<td>221 (13)</td>
<td>299 (10)</td>
<td>355 (25)</td>
<td>2750 (180)</td>
<td>3.23</td>
<td>3.42</td>
<td>4.62</td>
<td>5.49</td>
<td>42.5</td>
<td></td>
</tr>
</tbody>
</table>

*Values are means (SD) of five measurements.
†Calculated as (tissue/air)/(blood/air).

Table 3 Partition coefficients of C_5-C_10 alcohols in water, olive oil, human blood, and rat blood

<table>
<thead>
<tr>
<th>Alcohol</th>
<th>Water/air*</th>
<th>Olive oil/air*</th>
<th>Oil/Water†</th>
<th>Human blood/air*</th>
<th>Rat blood/air*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl</td>
<td>3330 (329)</td>
<td>82.5 (6.4)</td>
<td>0.025</td>
<td>2590 (270)</td>
<td>3440 (76)</td>
</tr>
<tr>
<td>Ethyl</td>
<td>2140 (200)</td>
<td>109 (10)</td>
<td>0.051</td>
<td>1440 (94)</td>
<td>2140 (180)</td>
</tr>
<tr>
<td>n-Propyl</td>
<td>1850 (170)</td>
<td>297 (38)</td>
<td>0.161</td>
<td>1120 (76)</td>
<td>1340 (54)</td>
</tr>
<tr>
<td>iso-Propyl</td>
<td>1500 (74)</td>
<td>154 (15)</td>
<td>0.103</td>
<td>848 (43)</td>
<td>1290 (46)</td>
</tr>
<tr>
<td>n-Butyl</td>
<td>1310 (220)</td>
<td>759 (87)</td>
<td>0.579</td>
<td>677 (79)</td>
<td>1160 (39)</td>
</tr>
<tr>
<td>iso-Butyl</td>
<td>1130 (37)</td>
<td>181 (25)</td>
<td>0.417</td>
<td>578 (75)</td>
<td>880 (37)</td>
</tr>
<tr>
<td>n-Pentyl</td>
<td>1080 (27)</td>
<td>1380 (130)</td>
<td>1.28</td>
<td>534 (23)</td>
<td>829 (56)</td>
</tr>
<tr>
<td>iso-Pentyl</td>
<td>850 (30)</td>
<td>1010 (100)</td>
<td>1.19</td>
<td>381 (16)</td>
<td>533 (42)</td>
</tr>
</tbody>
</table>

*Values are means (SD) of five measurements.
†Calculated as (oil/air)/(water/air).
Table 4  Partition coefficients of C1-C4 alcohols in rat tissues

<table>
<thead>
<tr>
<th>Alcohol</th>
<th>Muscle/air*</th>
<th>Brain/air*</th>
<th>Kidney/air*</th>
<th>Liver/air*</th>
<th>Fat/air*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Methyl</td>
<td>3980 (180)</td>
<td>3470 (300)</td>
<td>3190 (170)</td>
<td>3090 (180)</td>
<td>193 (36)</td>
</tr>
<tr>
<td>Ethyl</td>
<td>1710 (230)</td>
<td>1870 (81)</td>
<td>2030 (120)</td>
<td>1730 (160)</td>
<td>226 (13)</td>
</tr>
<tr>
<td>n-Propyl</td>
<td>1140 (100)</td>
<td>1220 (71)</td>
<td>1240 (38)</td>
<td>1290 (51)</td>
<td>0.85</td>
</tr>
<tr>
<td>iso-Propyl</td>
<td>1100 (120)</td>
<td>1130 (40)</td>
<td>1060 (23)</td>
<td>980 (120)</td>
<td>274 (26)</td>
</tr>
<tr>
<td>n-Butyl</td>
<td>900 (130)</td>
<td>1140 (38)</td>
<td>1160 (95)</td>
<td>1250 (44)</td>
<td>0.78</td>
</tr>
<tr>
<td>iso-Butyl</td>
<td>850 (66)</td>
<td>868 (22)</td>
<td>875 (42)</td>
<td>880 (100)</td>
<td>720 (50)</td>
</tr>
<tr>
<td>n-Pepty</td>
<td>814 (85)</td>
<td>1080 (89)</td>
<td>1100 (120)</td>
<td>1750 (250)</td>
<td>2560 (190)</td>
</tr>
<tr>
<td>iso-Pepty</td>
<td>788 (94)</td>
<td>614 (32)</td>
<td>717 (23)</td>
<td>940 (30)</td>
<td>1500 (130)</td>
</tr>
</tbody>
</table>

*Values are means (SD) of five measurements.
†Calculated as (tissue/air)/(blood/air).

Figure 2  Relation between human blood/air partition coefficient and water/air partition coefficient (alcohol data).

The order of blood/air partition coefficients (table 4). n-Isomers had higher partition values than the corresponding iso-isomers.

The tissue/blood partition coefficients of all alcohols tested were in the vicinity of unity, except for fat/blood partition coefficients which ranged from 0.06 (methyl alcohol) to 3.09 (iso-pentyl alcohol) (table 4). The data in table 4 suggest that methyl, ethyl, and propyl alcohols may preferentially distribute in the lean body tissues, whereas butyl and pentyl alcohols may uniformly distribute throughout the body.

The partition coefficients of some alcohols (methyl, ethyl, n-propyl, iso-propyl, and iso-butyl) between human blood and air reported by Fiserova-Bergerova and Diaz26 were much lower than the corresponding values in our study. For example, the value of the blood/air partition coefficient for methyl alcohol (2590) in this study was 1.6 times higher than the value (1626) given by Fiserova-Bergerova and Diaz. At present, no explanation is available for this discrepancy, except that because they used a gas standard, the air in the reference vessel in their study must have been almost dry (the vapour pressure was low) whereas the sample vessel was saturated with water vapour. This difference in the water vapour pressure may affect partition coefficients of such highly hydrophilic compounds as methyl alcohol. In fact, when we measured blood/air partition coefficient of methyl alcohol in essentially the same way as described by Fiserova-Bergerova and Diaz with a gas standard, the resultant coefficient value was 1780 (180) which is significantly lower than the value in the present study but almost comparable with the one given by Fiserova-Bergerova and Diaz. It should be remembered that alveolar air is saturated with water vapour.

Partition coefficients of some acetate esters and alcohols in water, blood, olive oil, and rat tissues.
T Kaneko, P Y Wang and A Sato

Occup Environ Med 1994 51: 68-72
doi: 10.1136/oem.51.1.68

Updated information and services can be found at:
http://oem.bmj.com/content/51/1/68

These include:

Email alerting service
Receive free email alerts when new articles cite this article. Sign up in the box at the top right corner of the online article.

Notes

To request permissions go to:
http://group.bmj.com/group/rights-licensing/permissions

To order reprints go to:
http://journals.bmj.com/cgi/reprintform

To subscribe to BMJ go to:
http://group.bmj.com/subscribe/