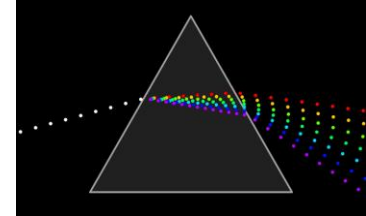


Jak na analýzu moravských humínových léčivých vod





Úvod



- Základní údaje o zdroji
- Stanovení huminových látek (HL) ČSN 75 7536
- Stanovení huminových látek spektrometricky
- Kvalitativní analýza HL

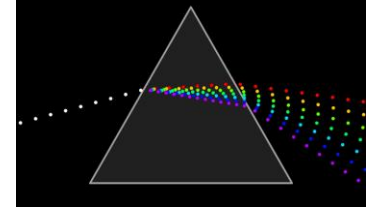
UV/Vis spektrometrie



FTIR spektrometrie



Základní údaje o zdroji



Rohatec-Soboňky

Hloubka vrtu 82 m



těkavé organické látky < 0,3–0,04 $\mu\text{g}\cdot\text{dm}^{-3}$

organochlorované pesticidy a polychlorované
bifenyly < 0,0002–0,02 $\mu\text{g}\cdot\text{dm}^{-3}$

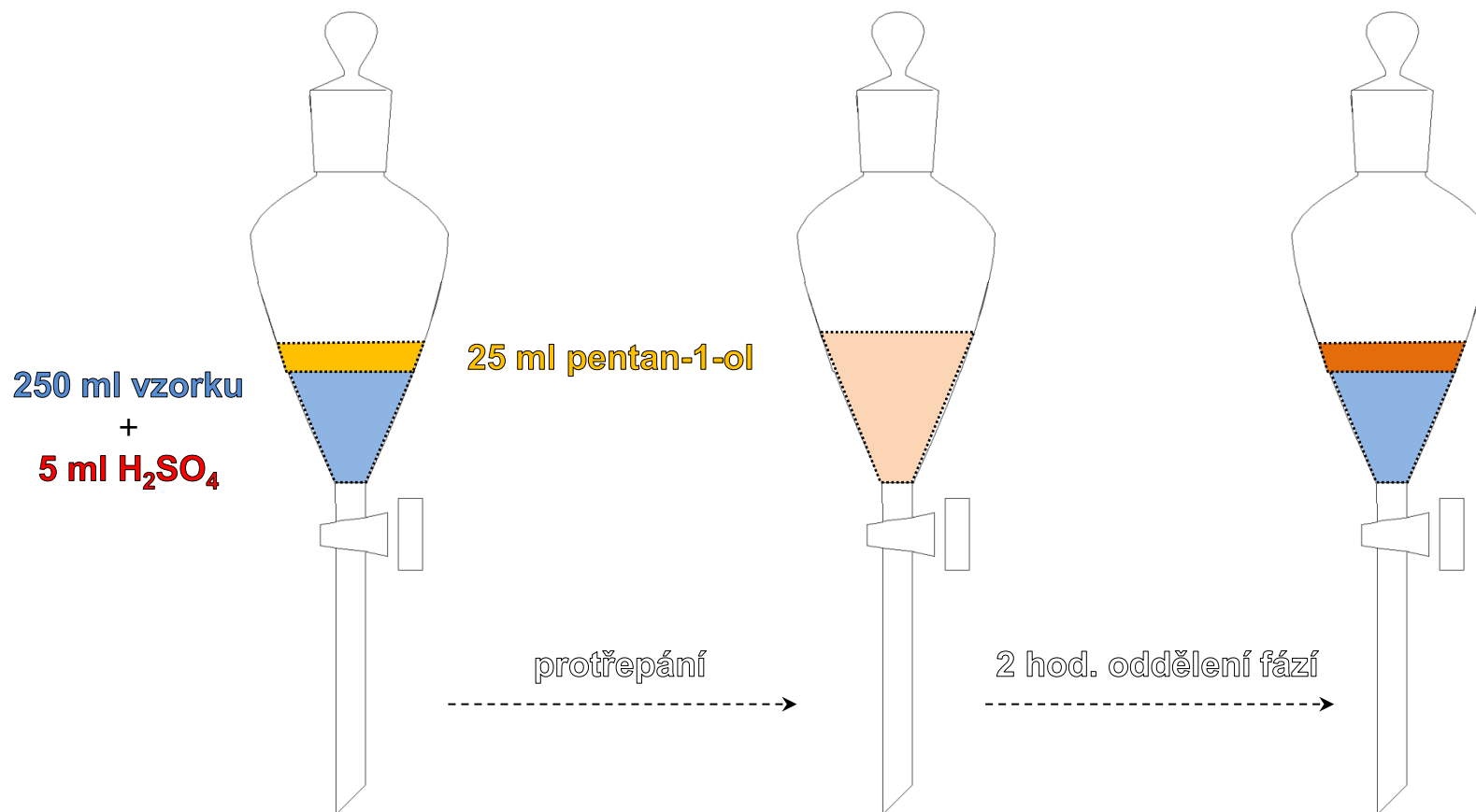
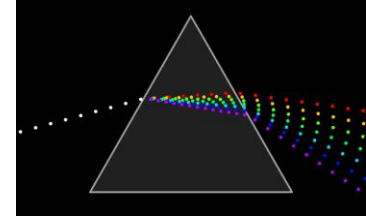
polycyklické aromatické
uhlovodíky < 0,001 $\mu\text{g}\cdot\text{dm}^{-3}$

	značka	obsah $\text{mg}\cdot\text{dm}^{-3}$
kationt		
Amonný iont	NH_4^+	1,68
Sodík	Na^+	45,40
Draslík	K^+	1,10
Vápník	Ca^{2+}	13,40
Hořčík	Mg^{2+}	6,40
Stroncium	Sr^{2+}	0,12
aniont		
hydrogenuhličitan	HCO_3^-	96,30
Chlorid	Cl^-	3,8
Bromid	Br^-	0,016
Jodid	I^-	0,019
Síran	SO_4^{2-}	0,9
hydrogenfosforečnan	HPO_4^{2-}	0,408
nedisociované složky		
kys. boritá	HBO_2	0,486
kys. křemičitá	H_2SiO_3	17

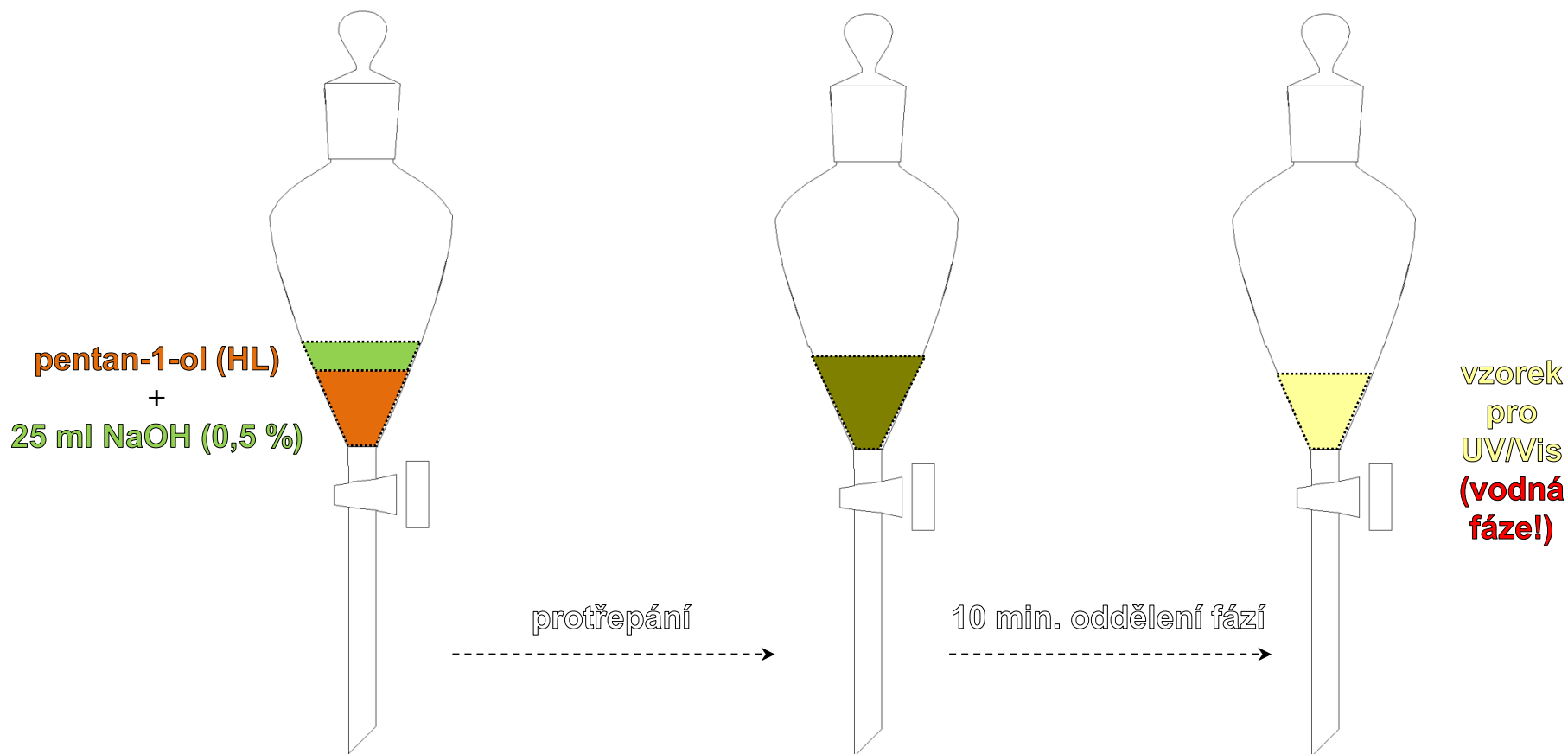
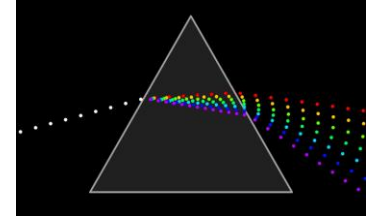
celková mineralizace 291 $\text{mg}\cdot\text{dm}^{-3}$



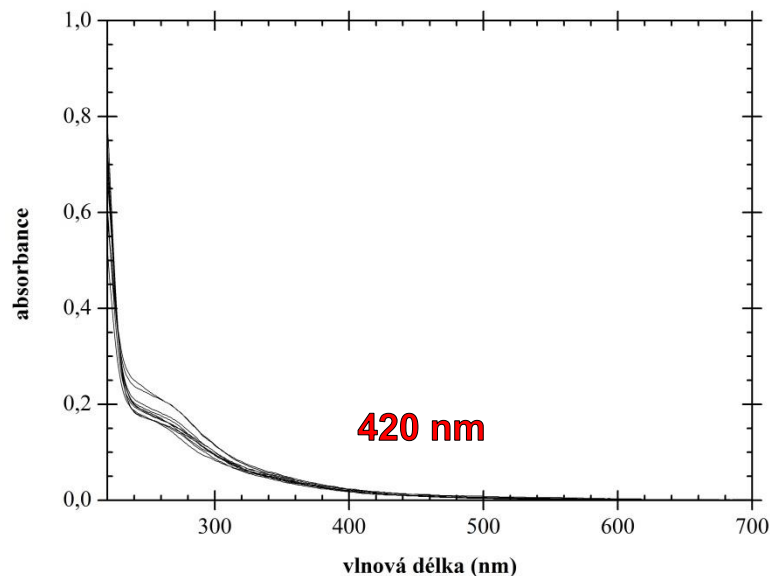
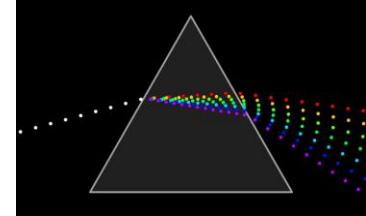
Stanovení huminových látek (HL) ČSN 75 7536



Stanovení huminových látek (HL) ČSN 75 7536



Stanovení huminových látek (HL) ČSN 75 7536



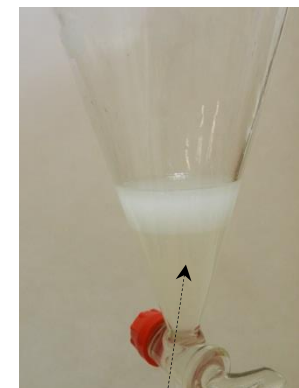
průměrný obsah HL (mg·dm ⁻³)	směrodatná odchylka HL (mg·dm ⁻³)	interval spolehlivosti (mg·dm ⁻³)
1,01	0,10	0,06

úroveň spolehlivosti = 95 %, velikost souboru = 10 hodnot

hmotnostní koncentrace HL

$$\rho(HL) = (A - A_0) \cdot K_p$$

68



extrakt HL

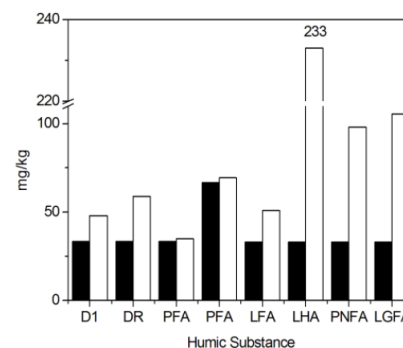
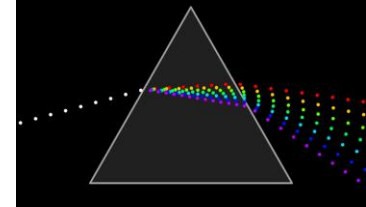


Fig. 1. Comparison of real HS concentration (black bars) with concentration determined by the Norm TNV 75 7536 (white bars).

Stanovení huminových látek spektrometricky



referenční materiál

Suwannee River FK (SRFA)

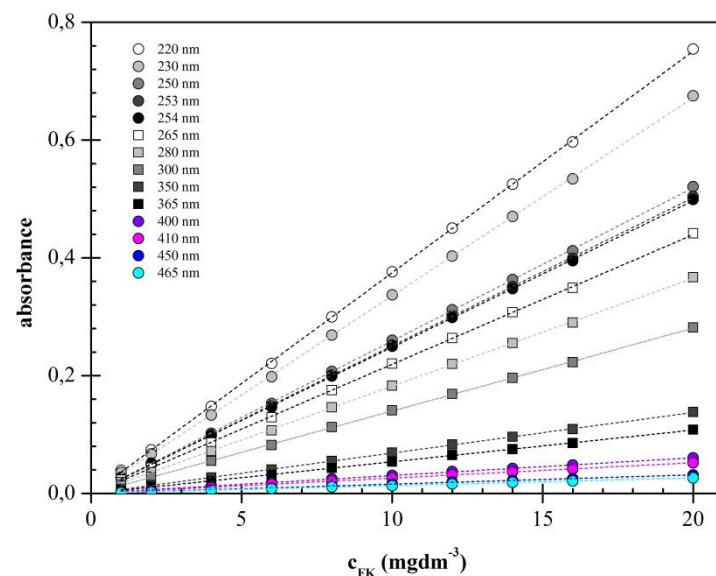
● 250 nm

■ 280 nm

■ 300 nm

■ 350 nm

● 400 nm



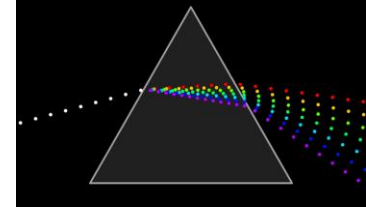
průměrný obsah HL ($mg \cdot dm^{-3}$)	směrodatná odchylka HL ($mg \cdot dm^{-3}$)	interval spolehlivosti ($mg \cdot dm^{-3}$)
0,79	0,10	0,03

úroveň spolehlivosti = 95 %, velikost souboru = 50 hodnot



Kvalitativní analýza HL

Izolace HL

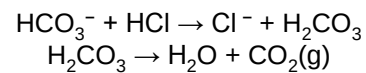


lyofilizace



30 dm³

sypký vzorek



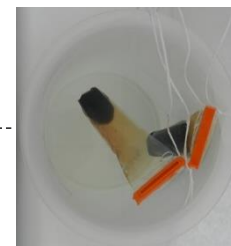
0,1 mol·dm³ HCl

vzorek roztok

ultrafiltrace



dialyzace



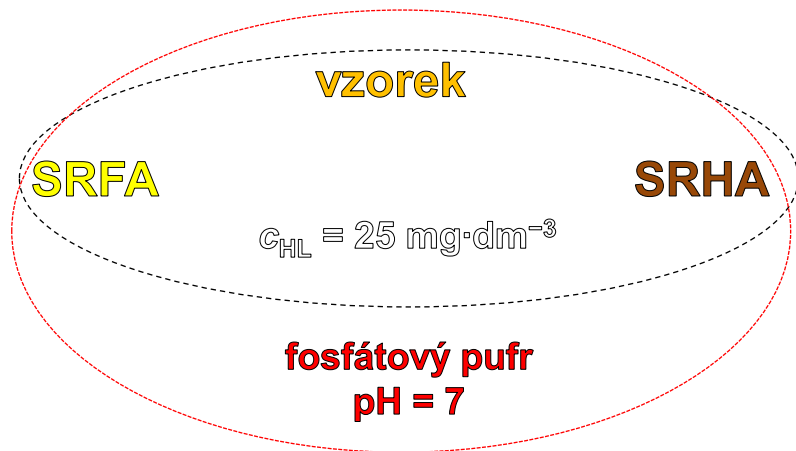
**vzorek roztok
(alkalický)**

XAD-8
pryskyřice

dialyzace

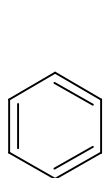


Kvalitativní analýza HL

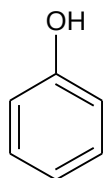


E_{ET}/E_{Bz}

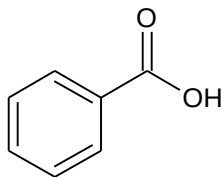
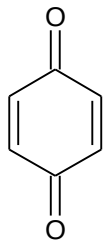
$E_{ET}/E_{Bz} > 0,40$



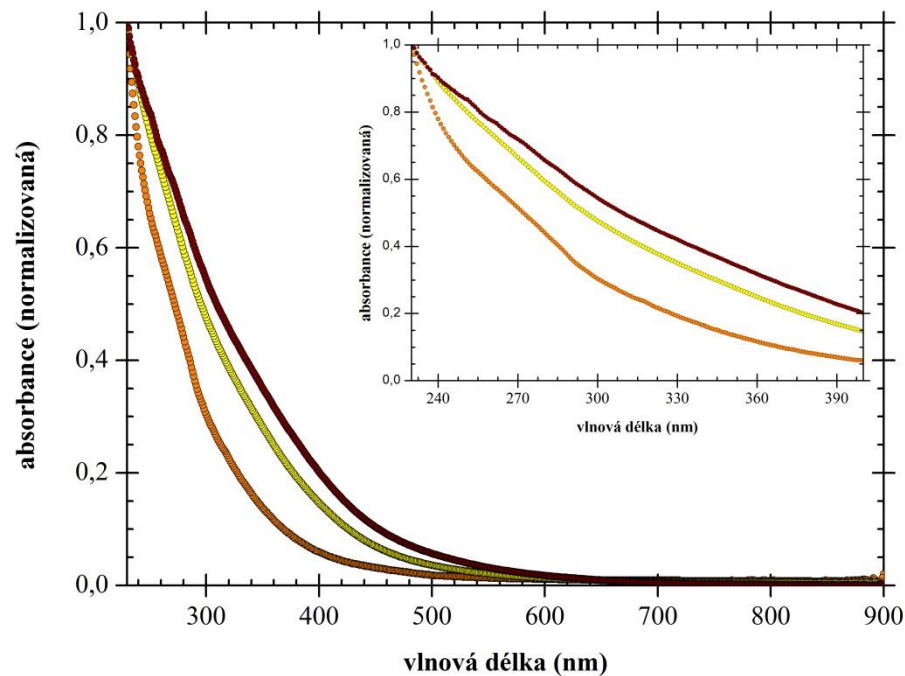
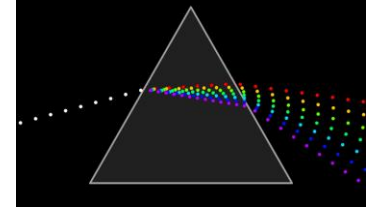
0,03



0,25–0,35



UV/Vis spektrometrie



	vzorek	SRFA	SRHA
E_4/E_6	20	14	8
E_{ET}/E_{Bz}	0,42	0,65	0,70

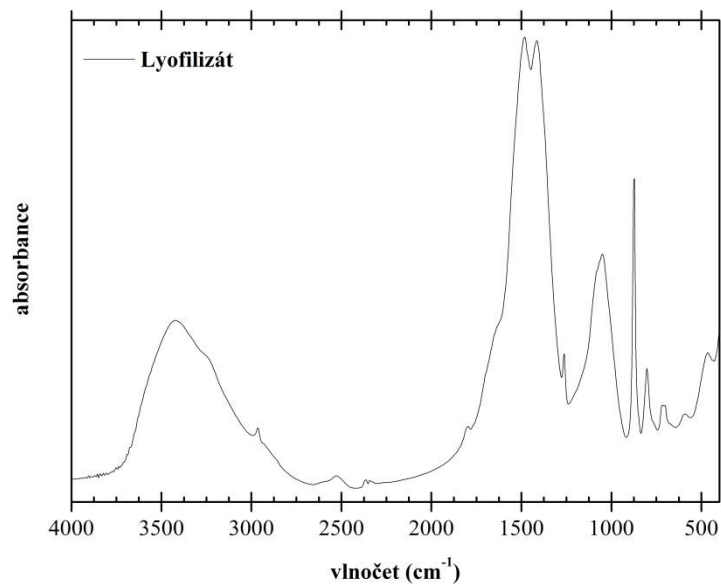
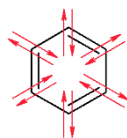
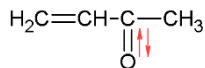
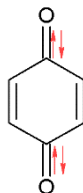
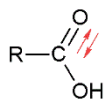
Kvalitativní analýza HL

$\approx 3400\text{--}3300\text{ cm}^{-1}$ HO--R

$\approx 2935\text{--}2925/2865\text{--}2845\text{ cm}^{-1}$ $\text{R--CH}_2\text{--CH}_2\text{--CH}_2\text{--R}$

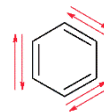
$\approx 1720\text{--}1710\text{ cm}^{-1}$

$\approx 1640\text{--}1600\text{ cm}^{-1}$

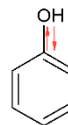


FTIR spektrometrie

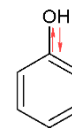
$\approx 1510\text{ cm}^{-1}$



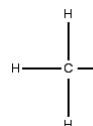
$\approx 1417\text{ cm}^{-1}$



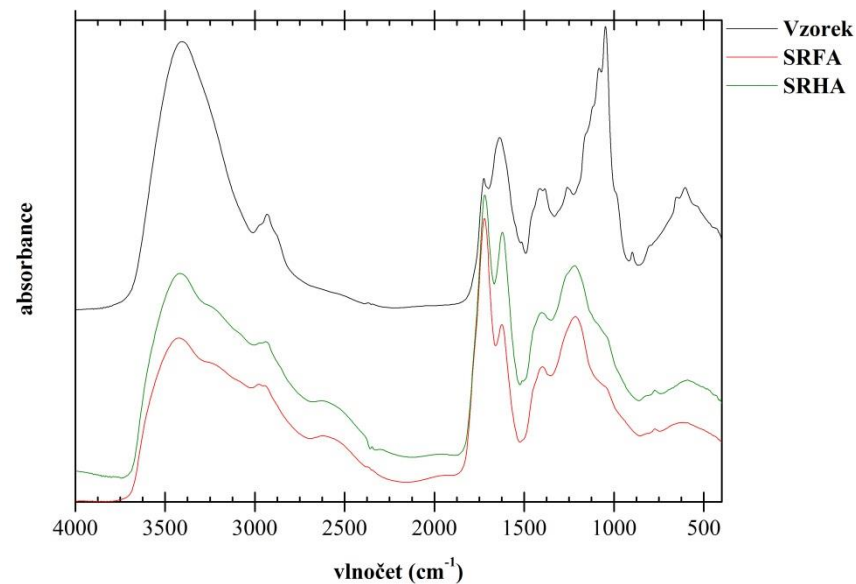
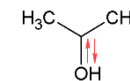
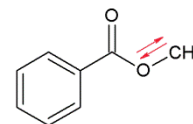
$\approx 1260\text{ cm}^{-1}$

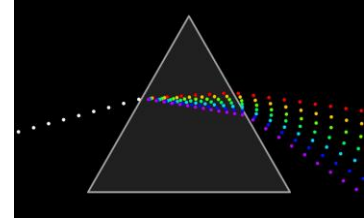


$\approx 1385\text{ cm}^{-1}$



$\approx 1080\text{ cm}^{-1}$





Děkuji za pozornost

